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AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY

WITH INDEXES

(Supplement 135)

DECEMBER 1974

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NASA SP-7011 (135)

AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY WITH INDEXES

(Supplement 135)

A selection of annotated references to unclassified reports and journal articles that were introduced into the NASA scientific and technical information system and announced in November 1974 in

- *Scientific and Technical Aerospace Reports (STAR)*
- *International Aerospace Abstracts (IAA).*

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INTRODUCTION

This Supplement to *Aerospace Medicine and Biology* (NASA SP-7011) lists 268 reports, articles and other documents announced during November 1974 in *Scientific and Technical Aerospace Reports (STAR)* or in *International Aerospace Reports (IAA)*. The first issue of the bibliography was published in July 1964; since that time, monthly supplements have been issued.

In its subject coverage, *Aerospace Medicine and Biology* concentrates on the biological, physiological, psychological, and environmental effects to which man is subjected during and following simulated or actual flight in the earth's atmosphere or in interplanetary space. References describing similar effects of biological organisms of lower order are also included. Such related topics as sanitary problems, pharmacology, toxicology, safety and survival, life support systems, exobiology, and personnel factors receive appropriate attention. In general, emphasis is placed on applied research, but references to fundamental studies and theoretical principles related to experimental development also qualify for inclusion.

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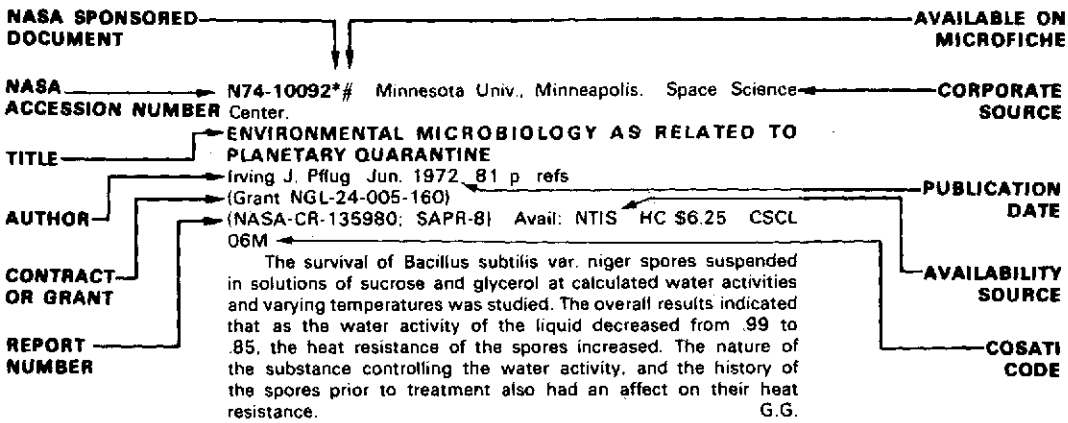

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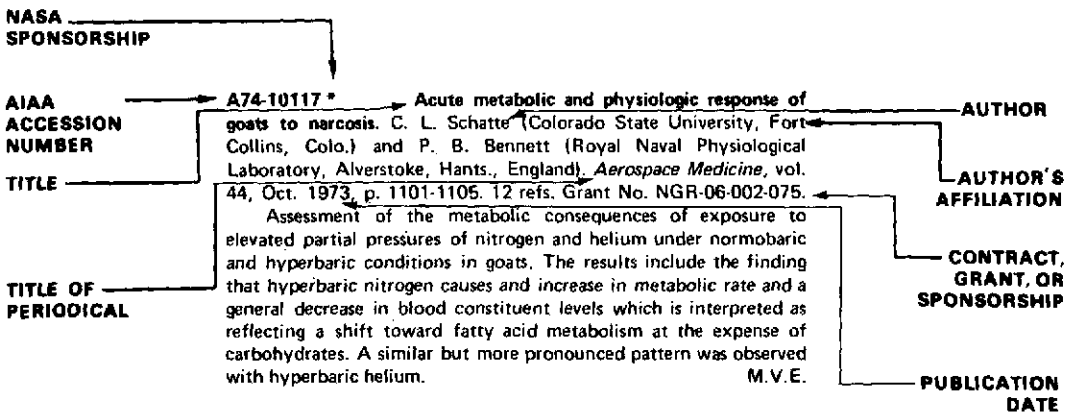

AEROSPACE MEDICINE AND BIOLOGY

A Continuing Bibliography (Suppl. 135) DECEMBER 1974

IAA ENTRIES

A74-40994 # **Otolith functions in weightlessness.** S. J. Gerathewohl (FAA, Office of Aviation Medicine, Washington, D.C.). *COSPAR, Plenary Meeting, 17th, São Paulo, Brazil, June 17-July 1, 1974, Paper.* 17 p. 51 refs.

The role of the vestibular organ in the exploration of space has been studied extensively during the past two decades. Many investigators have shown that some persons experience ill effects during the transition from the normal gravity to subgravity or weightlessness. Such adverse reactions can be related to a variety of sensory and somatic changes within the body systems; but it appears that the two major components of the unusual force field - namely, the absence of gravitational stimulation of the otolith organs and the occasional stimulation of the semicircular canals by head and body movements - bring about the motion sickness type reactions. Experiments in parabolic flights and in spacecraft revealed that the statolith organs respond to changes of acceleration during zero-G. After an initial period of increased activity during the transition from 1 G to zero-G, the number of nerve impulses from the otoliths is drastically decreased and becomes steady on a somewhat lower than normal level of the discharge rate. The various theories concerning otolith responses in weightlessness are discussed and validated against the actual findings on astronauts and cosmonauts during spaceflight experiments and missions. (Author)

A74-41001 * # **Effect of 14 days of bed rest on urine metabolite excretion and plasma enzyme levels.** N. Pace, B. W. Grunbaum, A. M. Kodama, D. F. Rahlmann (California, University, Berkeley, Calif.), and B. D. Newsom (NASA, Ames Research Center, Moffett Field, Calif.). *COSPAR, Plenary Meeting, 17th, São Paulo, Brazil, June 17-July 1, 1974, Paper.* 17 p. 11 refs. Grant No. NGR-05-003-470.

After 1 week of ambulatory base-line measurement, a group of 8 men 19-26 years of age remained continuously recumbent for 14 days. Studies were continued for 1 week following the prolonged recumbency. Urine excretion rates for a number of constituents were determined 2 days before bed rest, on day 14 of bed rest, and day 6 after bed rest. Blood plasma samples were also obtained at these times, and analyzed for several enzymes. On day 14 of bed rest significant increases were observed in urine excretion of total osmotically-active substances, magnesium, calcium, phosphate, creatinine, hydroxyproline, and 17-OH corticosteroids. A decrease occurred in urinary glucose excretion. Plasma levels of alkaline phosphatase and LDH-3 were depressed, while plasma GPT was elevated. Many of these changes persisted on day 6 after bed rest, and are interpreted as concomitants of the disuse atrophy of the musculoskeletal system that characterizes prolonged bed rest and weightlessness. (Author)

A74-41072 # **Conditioned motor reactions to rotation in intact labyrinthectomized cats (Usiovnye dvigatel'nye reaktsii na vrashchenie u intaktnykh i labirintektomirovannykh koshek).** M. A. Biriukova-Erogina (Gruzinskii Gosudarstvennyi Institut Fizicheskoi Kul'tury, Tiflis, Georgian SSR). *Zhurnal Vysshei Nervnoi Deiatel'nosti,* vol. 24, May-June 1974, p. 521-528. 22 refs. In Russian.

Investigation of the role of the vestibular analysor in the electro-defensive limb reaction to rotation in the sagittal plane, using intact and labyrinthectomized cats. The results indicate that, in the intact cat, conditioned limb flexions occur in response to sagittal-plane related positions, while in the labyrinthectomized cat, they occur in response to rotation, i.e., the traveled path along the rotation arc. M.V.E.

A74-41073 # **Functional connections between neurons following trigger stimulation (Funktsional'nye sviazi mezhdu korkovymi neironami pri triggernom razdrazhenii).** U. G. Gasanov and A. G. Galashina (Akademiia Nauk SSSR, Institut Vysshei Nervnoi Deiatel'nosti i Neirofiziologii, Moscow, USSR). *Zhurnal Vysshei Nervnoi Deiatel'nosti,* vol. 24, May-June 1974, p. 590-595. 14 refs. In Russian.

Review of investigation results on the functional connections between neurons of the auditory cortex in alert cats following trigger stimulations by acoustic clicks synchronous with the discharge of one of the neurons. The results clearly indicate the induction of neighboring neurons into the learning process and a considerable enhancement of their dependence on the neuron initially taught. M.V.E.

A74-41074 # **Neuron activity in the brain of a rabbit during 'ascent' and 'descent' in a pressure chamber (Aktivnost' neironov golovnogo mozga krolika pri 'pod'eme' i 'spuske' v barokamere).** E. N. Sokolov (Moskovskii Gosudarstvennyi Universitet, Moscow, USSR) and R. P. Steklova (Vsesoiuznyi Nauchno-Issledovatel'skii Institut Fizicheskoi Kul'tury, Moscow, USSR). *Zhurnal Vysshei Nervnoi Deiatel'nosti,* vol. 24, May-June 1974, p. 606-616. 16 refs. In Russian.

A74-41298 **Malignant hypertension.** F. A. Finnerty, Jr. (District of Columbia General Hospital, Washington, D.C.). *American Heart Journal,* vol. 88, Sept. 1974, p. 265-268. 11 refs.

In the treatment of accelerated malignant hypertension, the combination of diazoxide and furosemide is shown capable to provide cardiac output maintenance and increase in urinary output and sodium diuresis without adverse side effects. It does, however, have certain limitations, whose nature and neutralization possibilities are discussed. M.V.E.

A74-41299 **Vectorcardiographic comparison of left ventricular hypertrophy in idiopathic hypertrophic subaortic stenosis, aortic stenosis, and aortic regurgitation.** T. A. Brackbill and P. M. Shah (Rochester, University, Rochester, N.Y.). *American Heart Journal,* vol. 88, Sept. 1974, p. 269-276. 39 refs. Grants No. NIH-HL-03966; No. NIH-HL-05500.

A74-41300 **Left ventricular pressures during human coronary cinearteriography.** J. E. Madias (Boston City Hospital, Boston, Mass.) and E. M. Cohen (Tufts University, Boston, Mass.). *American Heart Journal,* vol. 88, Sept. 1974, p. 304-310. 37 refs.

Review of recordings of continuous left ventricular pressure obtained during coronary arteriography performed on patients with coronary artery disease or cardiomyopathy. Left ventricular end-diastolic pressures remained unchanged during injections but rose in a cumulative, incremental fashion between individual injections. The results suggest prompt recovery of left ventricular function after coronary contrast injection. M.V.E.

A74-41301 **The X prime descent in jugular contour nomenclature and recognition.** J. Constant (New York, State University, Buffalo, N.Y.). *American Heart Journal,* vol. 88, Sept. 1974, p. 372-379. 41 refs.

The recognition of jugular contours is discussed, along with the requirements of its extrication from the present nomenclature confusion in the literature. The term 'X prime' is revived in an attempt to bring order into the labeling of the systolic venous collapse. The descent of the base is shown to produce an X prime descent even in the presence of atrial fibrillation. An audiovisual method of recognizing the normal jugular contour is presented, utilizing the observation that the X prime descent falls on to the second heart sound. With proper nomenclature and the avoidance of artifact-laden pulse tracing teachings, physicians can be trained to recognize the normal jugular pulse contour by mere inspection of the neck. M.V.E.

A74-41302 **The action of vitamin C on blood vessels.** C. R. Spittle and M. R. C. Path (Pinderfields Hospital, Wakefield, Yorks., England). *American Heart Journal*, vol. 88, Sept. 1974, p. 387, 388. 8 refs.

Review of the relationship between vitamin C, fat, and blood vessels in the light of recent research. Vitamin C is shown to protect the capillaries by a direct action on the vessel walls. Its protective action on the veins and the arteries is a combination of its action on the vessel walls and the blood fats, with an indirect action on the coagulation system. M.V.E.

A74-41382 # **Deformability and strength of compact bone tissues under tension (Deformativnost' i prochnost' kompaktnoi kostnoi tkani pri rastiazhenii).** I. V. Knets, Iu. Zh. Saulgozis, and Kh. A. Ianson (Akademiia Nauk Latviiskoi SSR, Institut Mekhaniki Polimerov, Riga, Latvian SSR). *Mekhanika Polimerov*, May-June 1974, p. 501-506. 27 refs. In Russian.

Deformation and tensile strength were measured in compact tibial tissues of man under tension along the three principal axes of anisotropy. Variations in cross-sectional elastic moduli and in specific deformation energies are studied under loads. A correlation between the mechanical characteristics and the biochemical composition of the bone tissues is observed. V.Z.

A74-41383 # **Deformation of the abdominal aorta of man under biaxial tension (Deformirovanie briushnoi aorty cheloveka pri dvukhosnom rastiazhenii).** E. E. Tseders, V. A. Kas'ianov, and B. A. Purinia (Akademiia Nauk Latviiskoi SSR, Institut Mekhaniki Polimerov, Riga, Latvian SSR). *Mekhanika Polimerov*, May-June 1974, p. 507-513. 30 refs. In Russian.

A technique is described for studying the deformation of the abdominal aorta under biaxial tension. The technique is effective in applications to physically-nonlinear biopolymer materials such as blood vessels, skin, tendons, and neural stems. It is found that the strength and tensility of abdominal aorta walls are greater under uniaxial tension than under biaxial tension and that both variables decrease with age. V.Z.

A74-41412 **Judged acceptability of noise exposure during television viewing.** L. E. Langdon, R. F. Gabriel (Douglas Aircraft Corp., Long Beach, Calif.), and L. R. Creamer (California State University, Long Beach, Calif.). *Acoustical Society of America, Journal*, vol. 56, Aug. 1974, p. 510-515. 7 refs. Research sponsored by the McDonnell Douglas Independent Research and Development Program.

The results of artificial-noise using laboratory studies of the nuisance of flyover-caused noise masking of television audio signals frequently experienced by airport neighbors are reviewed. In three studies, the noise intensity, duration, and rate were varied. Acceptability was found to approximate a logarithmic function of noise energy for changes in intensity, duration, and rate. A fourth study showed aircraft-flyover recordings to be more acceptable than artificial noises even though they had equivalent peak levels and masking durations. M.V.E.

A74-41414 **Perstimulatory loudness adaptation in selected cochlear impaired and masked normal listeners.** D. D. Dirks, D. E. Morgan, and D. A. Bray (California, University, Los Angeles, Calif.). *Acoustical Society of America, Journal*, vol. 56, Aug. 1974, p. 554-561. 32 refs.

A74-41415 **Loudness discomfort level - Selected methods and stimuli.** D. E. Morgan, R. H. Wilson, and D. D. Dirks (California, University, Los Angeles, Calif.). *Acoustical Society of America, Journal*, vol. 56, Aug. 1974, p. 577-581. 16 refs.

A74-41416 **Ranke revisited - A simple short-wave cochlear model.** W. M. Siebert (MIT, Cambridge, Mass.). *(Acoustical Society of America, Meeting, 85th, Boston, Mass., Apr. 10-13, 1973.) Acoustical Society of America, Journal*, vol. 56, Aug. 1974, p. 594-600. 25 refs. Grant No. NIH-5-P01-GM-14940-06.

Reassessment of Ranke's (1950) analytical approaches for explaining the hydrodynamic behavior of the cochlea, using an integral equation for the pressure difference across the cochlear partition derived from classical assumptions and solvable to any desired precision by the numerical method of Lesser and Berkley (1972). The deviations from experiment Ranke's theory leads to are believed to be due not to its short-wave approximation per se, but rather to the basic physical simplifications common to all cochlear theories. M.V.E.

A74-41456 # **Genesis of oxygen fluctuations in the human brain (O geneze kolebanii kisloroda v mozge cheloveka).** V. B. Grechin and Iu. D. Kropotov (Akademiia Meditsinskikh Nauk SSSR, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 60, June 1974, p. 849-856. 10 refs. In Russian.

Discussion of the results of a correlation analysis of oxygen content fluctuations, integral neuron activity, and local blood flow in deep human brain structures during tranquil wakefulness, natural sleep, as well as during narcosis and performance of a prescribed mental task. The results reported seem to support the hypotesis about a connection of the maxima of autospectral functions of oxygen partial pressure fluctuations with the organization of neuroglial populations. M.V.E.

A74-41457 # **Interaction of emotional-behavioral responses and visual memory in monkeys (Vzaimovliianie emotsional'no-povedencheskikh reaktsii i zritel'noi pamiati u obez'ian).** I. V. Danilov and N. N. Kurdiavtseva (Akademiia Meditsinskikh Nauk SSSR, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 60, June 1974, p. 863-866. 8 refs. In Russian.

Experimental investigation of the interaction of aggressive-defensive responses with the visual memory in rhesus monkeys subjected to micropolarization of such brain structures as the visual and sensomotor cortex regions, the caudate nucleus, and the medial thalamus areas. The results include the finding that the emotional-behavioral responses of the aggressive-defensive type in rhesus monkeys are under the influence of visual perceptions. M.V.E.

A74-41458 # **Oxygen pressure in nerve cells and surrounding tissues (O napriazhenii kisloroda v nervnoi kletke i okruzhaiushchikh tkaniakh).** K. P. Ivanov (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR) and Iu. Ia. Kisliakov (Akademiia Nauk SSSR, Institut Evoliutsionnoi Fiziologii i Biokhimii, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 60, June 1974, p. 900-906. 8 refs. In Russian.

Review of the results of an investigation of the spatial distribution of partial oxygen pressure in a nerve cell and in the surrounding tissues performed with the aid of a mathematical model and digital computer. The results indicate that the partial oxygen distribution in the cell is complex in that it shows nearly every capillary a substantial gradient that gradually levels off in the internal regions of the inter-capillary space. M.V.E.

A74-41459 # **Effect of an inhibitor of DNA-dependent RNA synthesis and of stimulators of nucleic acid and protein metabolism on the electric activity of mechanoreceptors in the skin (Zavisimost' ingibitora DNK-zavisimogo sinteza RNK i stimuliatorov obmena nukleinovykh kislot i belkov na elektricheskuiu aktivnost' mekhanoretseptorov kozhi).** V. V. Dergachev, V. A. Bezborodov, F. A. Oreshuk, V. I. Bredov, and O. A. Krylov (Ministerstvo Zdravookhraneniia SSSR, Tsentral'nyi Institut Kurortologii i Fizioterapii, Moscow, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 60, June 1974, p. 917-923. 21 refs. In Russian.

A74-41460 # **Bilateral reflex effects of passive movements in the human ankle joint (Bilateral'nye reflektornye vliianiia passivnykh dvizhenii v golenostopnom sustave cheloveka).** I. N. Baranov-Krylov and B. N. Smetanin (Akademiia Nauk SSSR, Institut Problem Peredachi Informatsii, Moscow, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 60, June 1974, p. 933-939. 22 refs. In Russian.

A74-41461 # **Peculiarities of the manner in which training programs with different purposes affect the resistance of the human organism to the action of extreme heat (Osobennosti vliianiia trenirovok razlichnoi napravlennosti na ustoichivost' organizma cheloveka k ekstremal'nomu teplovomu vozdeistviiu).** F. T. Agarkov, V. A. Romanenko, and I. A. Merkur'ev (Gosudarstvennyi Meditsinskii Institut, Donetsk, Ukrainian SSR). *Fiziologicheskii Zhurnal SSSR*, vol. 60, June 1974, p. 978-981. 9 refs. In Russian.

A74-41462 # **Slow negative wave in the EEG of man and the reaction time (Medlennaia negativnaia volna v EEG cheloveka i vremia reaktsii).** L. P. Kukinova and M. P. Ivanova (Vsesoiuznyi Nauchno-Issledovatel'skii Institut Fizicheskoi Kul'tury, Moscow, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 60, June 1974, p. 981-985. 14 refs. In Russian.

Study of slow waves in EEGs of athletes and nonathletes recorded from the rolandic area, and investigation of the connection, if any, between the wave amplitude and the reaction time. A slow negative wave is found to form in rolandic convolutions before a voluntary movement. The amplitude of the slow negative wave is found to be greater and the reaction time shorter in athletes than in nonathletes. Also, an inverse relation is found to exist between the amplitude of the slow negative wave and the latent motor reaction time. M.V.E.

A74-41476 **An algorithm for locating the aortic valve and the apex in left-ventricular angiocardiograms.** R. L. Griffith (Virginia, Medical College, Richmond, Va.), C. Grant (U.S. Veterans Administration Hospital, Albany, N.Y.), and H. Kaufman (Rensselaer Polytechnic Institute, Troy, N.Y.). *IEEE Transactions on Biomedical Engineering*, vol. BME-21, Sept. 1974, p. 345-349. 18 refs.

Efforts to automate the estimation of left-ventricular volume from serial angiocardiograms have neglected the explicit location of the aortic valve line and the ventricle apex. From heuristic considerations of typical aorta-ventricle outlines, an algorithm has been developed to find these key points. The algorithm tracks the turning of the aorta-ventricle outline and uses this information to find the apex and to nominate points for ends of the aortic valve line. The correct valve points maximize an objective function defined on distance measures and the turn information. The algorithm represents a significant step in the direction of completely automated analysis of ventricular angiocardiograms. (Author)

A74-41477 **The active fiber in a volume conductor.** R. Plonsey (Case-Western-Reserve University, Cleveland, Ohio). *IEEE Transactions on Biomedical Engineering*, vol. BME-21, Sept. 1974, p. 371-381. 18 refs. Grant No. NIH-HL-10417.

This paper considers the quantitative description of intracellular and extracellular fields of a single circular cylindrical fiber resulting from the propagation of an action potential (AP). Several formulations are noted, but one, which permits identification of free-space source-sink relationships, is examined in some detail; the physical models which it gives rise to are described and developed. Desirable approximations are considered and the conditions of their validity are discussed. A convolution integral formulation to field patterns (from their sources) is presented. Axially symmetric anisotropic media are also considered. (Author)

A74-41478 **An amplitude-modulation model for the QRS complexes of electrocardiograms.** T. Y. Lee. *IEEE Transactions on Biomedical Engineering*, vol. BME-21, Sept. 1974, p. 381-386. 11 refs.

Amplitude-modulation expressions are derived for an idealized QRS loop which is intended to approximate the shapes and speeds of loops of normal subjects. Possibilities are revealed for having the constituent parts of a QRS electrocardiogram complex identified as the envelope-carrier pair or the carrier-sideband pair of an ordinary amplitude-modulated wave. This QRS behavior may open up a way for the envelopes to be employed as diagnostic criteria. M.V.E.

A74-41479 **Pulse pressure contour method testing via hybrid computer simulation.** D. A. Gall (Arizona Heart Institute, Phoenix, Ariz.) and F. W. Paul (Carnegie-Mellon University, Pittsburgh, Pa.). *IEEE Transactions on Biomedical Engineering*, vol. BME-21, Sept. 1974, p. 406-413. 15 refs.

A computer simulation study is shown to indicate that the pulse pressure contour method of Warner et al. (1953) for determining cardiac output is highly sensitive to changes in heart rate, peripheral vascular resistance, and arterial compliance. The results obtained from the computer simulation study correlate reasonably with experimentally obtained results. M.V.E.

A74-41480 **Thin-film temperature sensors for biological measurements.** C. P. Cain (Eastern Virginia Medical School, Norfolk, Va.) and A. J. Welch (Texas, University, Austin, Tex.). *IEEE Transactions on Biomedical Engineering*, vol. BME-21, Sept. 1974, p. 421-423. Contract No. F44620-71-C-0091.

Thin-film microthermocouples are discussed whose development has made possible dynamic and static temperature measurements in biological tissues. These probes use a quartz substrate and exhibit response times of less than a millisecond with thermal properties similar to tissue. Their thermoelectric EMF is linearly dependent on temperature over the range normally encountered in biological measurements. Probe-tip diameters as small as 10 microns are being fabricated. M.V.E.

A74-41481 **A thermesthesiometer - An instrument for burn hazard measurement.** L. A. Marzetta (National Bureau of Standards, Institute for Applied Technology, Washington, D.C.). *IEEE Transactions on Biomedical Engineering*, vol. BME-21, Sept. 1974, p. 425-427.

Description of an instrument equipped with a measuring probe for indicating the temperature that would be experienced if human contact were made with a hot surface of some object in order to determine the hazard to man of such a contact. The correct value of interface contact temperature can be read for a selected contact time without knowing the composition or temperature of the heated material under test. M.V.E.

A74-41534 * **Inferences from protein and nucleic acid sequences - Early molecular evolution, divergence of kingdoms and rates of change.** M. O. Dayhoff, W. C. Barker, and P. J. McLaughlin (Georgetown University Medical Center, Washington, D.C.). *Origin of Life*, vol. 5, July-Oct. 1974, p. 311-330. 41 refs. Contract No. NASw-2288; Grants No. NIH-GM-08710; No. NIH-RR-05681.

Description of new sensitive, objective methods for establishing the probable common ancestry of very distantly related sequences and the quantitative evolutionary change which has taken place. These methods are applied to four families of proteins and nucleic acids and evolutionary trees will be derived where possible. Of the three families containing duplications of genetic material, two are nucleic acids: transfer RNA and 5S ribosomal RNA. Both of these structures are functional in the synthesis of coded proteins, and prototypes must have been present in the cell at the inception of the fundamental coding process that all living things share. There are many types of tRNA which recognize the various nucleotide triplets and the 20 amino acids. These types are thought to have arisen as a result of many gene duplications. Relationships among these types are discussed. The 5S ribosomal RNA, presently functional in both eukaryotes and prokaryotes, is very likely descended from an early form incorporating almost a complete duplication of genetic material. The amount of evolution in the various lines can again be compared. The other two families containing duplications are proteins; ferredoxin and cytochrome c. (Author)

A74-41535 * **On the possible origin and evolution of the genetic code.** T. H. Jukes (California, University, Berkeley, Calif.). *Origin of Life*, vol. 5, July-Oct. 1974, p. 331-350. 31 refs. Grant No. NGR-05-003-460.

The genetic code is examined for indications of possible preceding codes that existed during early evolution. Eight of the 20

amino acids are coded by 'quartets' of codons with fourfold degeneracy, and 16 such quartets can exist, so that an earlier code could have provided for 15 or 16 amino acids, rather than 20. If twofold degeneracy is postulated for the first position of the codon, there could have been ten amino acids in the code. It is speculated that these may have been phenylalanine, valine, proline, alanine, histidine, glutamine, glutanic acid, aspartic acid, cysteine and glycine. There is a notable deficiency of arginine in proteins, despite the fact that it has six codons. Simultaneously, there is more lysine in proteins than would be expected from its two codons, if the four bases in mRNA are equiprobable and are arranged randomly. It is speculated that arginine is an 'intruder' into the genetic code, and that it may have displayed another amino acid such as ornithine, or may even have displayed lysine from some of its previous codon assignments. As a result, natural selection has favored lysine against the fact that it has only two codons. (Author)

A74-41536 Genetics and the origin of the genetic code. G. W. R. Walker (Alberta, University, Edmonton, Canada). *Origin of Life*, vol. 5, July-Oct. 1974, p. 351-356.

The genetic code has been analyzed by a method similar to that used by Mendel. The current codon catalog is shown to be symmetrically subdivisible into two discrete subcatalogs of eight quartets each by classifying the quartets as monocoding vs heterocoding. The internal symmetries of the two subcatalogs are identical and are governed by two common parity rules. These rules, together with one governing the subdivision itself, can be explained by the hypothesis that two primeval sets of polynucleotide-borne anticodons, corresponding closely but not exactly with the subcatalogs originated independently and separately (were not originally together within any replicating pre- or proto-biont). The discorrespondence between the primeval sets and the subcatalogs is itself symmetrical, involving quartets sharing identical locations in the two subcatalogs. The primeval sets correspond exactly with the subdivisions of the catalog proposed by Skoog and coworkers on the basis of the presence vs the absence of cytokinins or 'cytokininlike bases' adjacent to the anticodons. (Author)

A74-41537 Origin of the genetic code - A physical-chemical model of primitive codon assignments. J. Nagyvary and J. H. Fendler (Texas A & M University, College Station, Tex.). *Origin of Life*, vol. 5, July-Oct. 1974, p. 357-362. 13 refs. Research supported by the Robert A. Welch Foundation.

Selective compartmentalization of amino acids and nucleotides according to their polarities is proposed as a physical-chemical model for the origin of the genetic code. Assumptions made in this hypothesis are: (1) an oil-slick covered the surface of the primitive ocean, constituents of which formed association colloids or micelles at the water-oil-air interfaces; (2) depending on the polarity of the media, these aggregates possessed hydrophilic and hydrophobic interiors where selective uptake of amino acids and nucleic acid constituents could take place; and (3) condensation and polymerization in the micellar phase were enhanced. According to the chromatographically observed polarities, for example, lysine and uridylate fall into the hydrophilic compartment, and phenylalanine and adenylate are enriched in the hydrophobic environment. These components could be condensed to form a charged adaptor loop with an anticodon which is complementary to the presently valid codon. (Author)

A74-41538 The iron-sulphur proteins - Evolution of a ubiquitous protein from model systems to higher organisms. D. O. Hall, R. Cammack, and K. K. Rao (King's College, London, England). *Origin of Life*, vol. 5, July-Oct. 1974, p. 363-386. 98 refs.

Ferredoxins are Fe-S proteins with low molecular weight (6 to 12,000) which act as electron carriers at very low redox potentials (e.g., -300 to -500 mV) in diverse biochemical processes such as bacterial and plant photosynthesis, N2 fixation, carbon metabolism, oxidative phosphorylation, and steroid hydroxylation. They are found in a wide range of organisms from the 'primitive' obligate anaerobic bacteria, through photosynthetic bacteria, blue-green and green algae, to all higher plants and animals. Three types of ferredoxins are known - 8Fe + 8S, 4Fe + 4S, and 2Fe + 2S. All three have been found in bacteria, while the 2Fe and some 8Fe ferredoxins have been found in plants and animals, possibly representing an evolutionary sequence. The 8Fe ferredoxin may all be composed of two 4Fe units. It is proposed that, because of the simplicity of the 8Fe ferredoxins (only 9 common simple amino acids in clostridia, 6 of which have been detected in the Murchison meteorite), they may have been among the earliest proteins formed during the origin of life. (Author)

A74-41539 A new hypothesis for the evolution of biological electron transport. H. Baltscheffsky (Stockholm, University, Stockholm, Sweden). *Origin of Life*, vol. 5, July-Oct. 1974, p. 387-395. 27 refs.

A new hypothesis for the evolution of biological electron transport is presented. According to this hypothesis, biological electron transport originated close to the potential of the hydrogen electrode and evolved in various advantageous directions, including, when molecular oxygen became available on the earth, that of the oxygen electrode. This implies stepwise evolution along and across the potential scale. The hypothesis is based mainly on existing information obtained from studies of primary and tertiary structural relationships of proteins. It is hoped to provide a framework for closer understanding of both evolution and mechanisms of cellular oxidation-reduction as well as energy coupling reactions. (Author)

A74-41540 Pathways of chemical evolution of photosynthesis. A. A. Krasnovskii (Akademiia Nauk SSSR, Institut Biokhimii, Moscow, USSR). *Origin of Life*, vol. 5, July-Oct. 1974, p. 397-404. 12 refs.

The primary metabolism of protobionts was probably based on the electron transfer reactions regulated by catalysts or photosensitizing pigments. The action of photoreceptive pigments was inevitable in the case of electron transfer leading to light energy storage in the reaction products. The primitive tetrapyrrolic pigments formed abiogenically (porphin, chlorin), as well as their more complicated biogenic analogs (chlorophylls), are capable of photosensitizing electron transfer in systems having various degree of molecular complexity. The inorganic photosensitizers (titanium dioxide, zinc oxide, etc.) being excited in near UV are able to perform the same reactions as porphyrins-electron transfer from donor to acceptor molecule (including photoreduction of viologens) or water molecule photooxidation (oxygen liberation), coupled with reduction of ferric compounds and quinones. The inorganic photosensitizers are not used in biological evolution; actually, the inorganic ions entered into a tetrapyrrolic cycle, forming effective photocatalysts. (Author)

A74-41541 Inorganic types of fermentation and anaerobic respirations in the evolution of energy-yielding metabolism. F. Egami (Mitsubishi-Kasei Institute of Life Sciences, Tokyo, Japan). *Origin of Life*, vol. 5, July-Oct. 1974, p. 405-413. 29 refs.

The following sequence has been proposed as one of the main pathways in the evolution of energy-yielding metabolism: fermentation to nitrate fermentation to nitrate respiration to oxygen respiration. In the present report the concept is presented in a more general form: (1) fermentation to (2) fermentation with H2 release to (3) inorganic types of fermentation to (4) anaerobic respirations to (5) oxygen respiration. The energy-yielding efficiency increased gradually together with the evolution. Step (2) is characterized by the participation of ferredoxin, step (3) by the establishment of electron transfer chain, and step (4) by the participation of cytochrome and oxidative phosphorylation. The close relationship between the primary structure of ferredoxins of anaerobic bacteria and that of a cytochrome was demonstrated. It reveals that the transition from inorganic types of fermentation to anaerobic respirations was direct and was accompanied by the transition from ferredoxins to cytochromes. (Author)

A74-41542 * Test results on the Viking gas chromatograph-mass spectrometer experiment. K. Biemann (MIT, Cambridge, Mass.). *Origin of Life*, vol. 5, July-Oct. 1974, p. 417-430. 6 refs. Project VIKING.

The gas chromatograph-mass spectrometer instrument to be utilized in the Viking 1975 Molecular Analysis experiment has undergone preliminary testing in its flight configured version. A synthetic mixture of 24 components as well as a sample of the Murchison meteorite has been used for this purpose. The resulting data not only allowed the identification of most of the organic compounds known to be present, but also revealed the identity of a few unexpected ones. Thus, the sensitivity and reliability of the instrument and data system are satisfactorily demonstrated. (Author)

A74-41544 * Organic contamination problems in the Viking molecular analysis experiment. D. A. Flory, J. Oro (Houston, University, Houston, Tex.), and P. V. Fennessey (Martin Marietta Aerospace, Denver, Colo.). *Origin of Life*, vol. 5, July-Oct. 1974, p. 443-455. 7 refs. Contracts No. NAS1-9685; No. NAS1-9000.

A principal problem in interpreting the results of an organic analysis of an extraterrestrial sample is that of distinguishing contaminating material from indigenous material when unknown types and amounts of contaminants make their way into the sample being analyzed. An approach to control of sample integrity in the Viking molecular analysis experiment has been devised which it is believed, will eliminate such problems. Basically this involves (1) placing an upper limit on the amount of terrestrial contamination that can be tolerated and still allow scientifically meaningful analysis, (2) identifying the potential sources of contamination and analyzing their relative significance, (3) establishing methods to control these sources, and (4) obtaining complete information on the chemical composition of potential contaminants. Previous experience in the Apollo mission has been of great value in developing the Viking program, perhaps the most important carryover being the recognition of the importance of establishing a comprehensive contamination control program in the early stages of mission planning and hardware design. (Author)

A74-41547 * Life on Jupiter. W. F. Libby (California, University, Los Angeles, Calif.). *Origins of Life*, vol. 5, July-Oct. 1974, p. 483-486. 13 refs. Grant No. NGR-05-007-003.

The possibilities of life on Jupiter are discussed from the point view of life as known on earth. That is, it is assumed that any life on Jupiter would not involve new principles foreign to us. Proteins would be a constituent as would fats and the other building blocks of living organisms on earth. This leads to a set of limiting parameters, such as pressure. Studies in the laboratory have shown that proteins and other essential molecules are denatured by pressures of 4000 atm and higher. Thus, life cannot be expected to exist in the great depths of the Jovian atmosphere. It could exist only at depths of several hundred kilometers in the atmosphere. Since no solid surface could possibly exist at such altitudes, any organisms present must be small enough to be buoyed up by the turbulent atmospheric currents or must fly or both. Such possibilities, however, seem to be real. The necessary nutrients to preserve life and foster growth could be furnished by the Miller-Urey type reactions of ionizing radiation on the reducing atmosphere undoubtedly present. (Author)

A74-41548 The possibility of organic molecule formation in the Venus atmosphere. V. A. Otroshchenko and Iu. A. Surkov (Akademiia Nauk SSSR, Institut Geokhimii i Analiticheskoi Khimii, Moscow, USSR). *Origins of Life*, vol. 5, July-Oct. 1974, p. 487-490. 25 refs.

Based on the detection of ammonia in the Venus atmosphere and the suggested presence of hydrogen chloride, a structure for the Venus atmosphere was suggested as having three cloud layers, consisting of ammonium chloride (30 to 50 km above the ground), a mixture of ammonium bicarbonate and ammonium carbamate (NH2COOHN4) from 50 to 60 km, and water ice crystals above this. There is a strong possibility of electrical discharge in the atmosphere as a result of thermal convective turbulence, which in the case of the slightly reducing atmosphere outlined above could lead to organic compound formation. The hypothesis was tested experimentally by passing a 60-kV spark from platinum electrodes through a gas mixture with the composition N2 (0.2%), NH3 (2%), water (5%), O2 (0.6%), and CO2 (remainder) for 8 hr. The products were analyzed by mass spectrometer (MS) and amino acid analysis by ion exchange. Methane and formaldehyde were identified by MS, and glycine and alanine by the amino acid analyzer. The presence of organic compounds in the Venus atmosphere is therefore a strong possibility. (Author)

A74-41549 Planetary systems and extraterrestrial life. S. S. Kumar (Virginia, University, Charlottesville, Va.). *Origins of Life*, vol. 5, July-Oct. 1974, p. 491-495. 14 refs.

Review of the present status of the problem of the existence of other planetary systems in the Galaxy. Observational data and theoretical results are presented to show that the occurrence of planetary systems is, most probably, not a universal phenomenon. Study of the stability of planetary orbits in the vicinity of double stars indicates that, in general, planetary systems cannot survive around them over long periods. Therefore, the possibility of the existence of planetary systems similar to our own in the neighborhood of double stars must be ruled out. In the solar neighborhood, at least 60% of the stars are known to be members of double systems. The nature of the 'dark' companions is discussed, and it is concluded that they are stellar objects and not planets. Recent work on the absence of a perturbation in the motion of Barnard's star is discussed. Comments are made on the existence of extraterrestrial life in the solar system and around other stars in the Galaxy. (Author)

A74-41550 * The origin of life in a cosmic context. C. Sagan (Cornell University, Ithaca, N.Y.). *Origins of Life*, vol. 5, July-Oct. 1974, p. 497-505. 26 refs. Grant No. NGR-33-010-101.

It is shown that there is at present no aspect of contemporary biology where the contingent can be distinguished from the necessary, or the evolutionary accident from the biological sine qua non; and no amount of terrestrial experimentation alone is likely to make such distinctions possible. Hence, biology suffers from a deadening parochialism, much like the physics of falling bodies before Newton showed that the same laws applied to the motion of apples in England and to the planets about the sun. The deparochialization of biology can only come in the same way and must therefore await the search for extraterrestrial life. It is in this sense that the significance of explorations of the planets and their satellites, asteroids, comets, and the interplanetary medium for the origin of life is assessed. M.V.E.

A74-41676 # Background impulse activity of neuronally isolated cortex cells in chronic experiments (Fonovaia impul'snaia aktivnost' kletok neironal'no-izolirovannoi kory v khronicheskom eksperimente). E. G. Zarkeshev (Akademiia Meditsinskikh Nauk SSSR, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 60, July 1974, p. 1001-1008. 26 refs. In Russian.

The extracellular background impulse activity of the visual, auditory, parietal, and associative regions of a neuronally isolated cerebral cortex of one hemisphere was studied in chronic experiments with cats. The isolation of the cortex of one hemisphere was accomplished by the Hananashvili (1961) technique. Three to four weeks following the cortex isolation, the background impulse activity is found to grow increasingly complex. The regional peculiarities of this activity are discussed. M.V.E.

A74-41677 # Dependence of absolute auditory sensitivity levels on the number of stimulating tone periods (Zavisimost' urovnei absoliutnoi slukhovoi chuvstvitel'nosti ot chisla periodov stimuliruiushchego tona). V. A. Saprykin, G. V. Bogdanov, A. I. Lopotko, Iu. K. Nikitin, and A. A. Sagal (Akademiia Nauk SSSR, Sanitarno-Gigienicheskii Meditsinskii Institut and Institut Evoliutsionnoi Fiziologii i Biokhimii, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 60, July 1974, p. 1049-1055. 16 refs. In Russian.

A74-41678 # **Blood flow in human muscles determined by the Xe-133 elution rate (Krovotok v myshtsakh cheloveka, opredeliaemyi po skorosti vymyvaniia Xe-133).** O. L. Vinogradova, Ia. M. Kots, I. M. Rodionov, A. P. Savchenko, and V. I. Tkhorevskii (Moskovskii Gosudarstvennyi Universitet; Akademiia Meditsinskikh Nauk SSSR; I Moskovskii Meditsinskii Institut, Moscow, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 60, July 1974, p. 1065-1073. 35 refs. In Russian.

Comparative study of the blood flow in musculus soleus and musculus tibialis in man, using the Xe-133 elution rate technique. The observed difference in the blood supply of these two muscles at rest, during muscle contraction, and in the presence of emotional stress is believed to be due to the different proportions of red aerobic and white anaerobic fibers making up musculus soleus and musculus tibialis. M.V.E.

A74-41679 # **Effect of thyrocalcitonin on the contraction and electric activity of myocardium cells (Effekt tirokal'tsitonina na sokratitel'nuiu i elektricheskuiu aktivnost' kletok miokarda).** V. V. Barabanova, A. I. Briskin, and R. S. Orlov (Leningradskii Sanitarno-Gigienicheskii Meditsinskii Institut; Vsesoiuznyi Nauchno-Issledovatel'skii Institut Tekhnologii Krovezamenitelei i Gormonal'nykh Preparatov, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 60, July 1974, p. 1086-1090. 8 refs. In Russian.

Electrical effects of thyrocalcitonin (TCT) on myocardium cell activity are found to consist in increases in amplitude and decreases in potential action duration, whereas contraction effects of TCT show two phases: an initial increase in contraction amplitude, later superseded by a decrease. It is believed that releases of calcium ions from the cell membrane and increases in ions motion velocity underlie these TCT effects. M.V.E.

A74-41680 # **Correlative relations between arterial pressure and coronary blood stream during lasting stimulation of the lateral hypothalamic nuclei of non-anesthetized animals (Korreliatsionnye otnosheniia arterial'nogo davleniia i koronarnogo krovotoka v khode dlitel'noi stimuliatsii lateral'nykh iader gipotalamusa nenarkotizovannykh zhivotnykh).** S. P. Nogina (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 60, July 1974, p. 1091-1099. 18 refs. In Russian.

A74-41681 # **Parameters of a rotary nystagmus model under normal and pathological conditions (O parametrakh modeli vrashchatel'nogo nistagma v norme i pri patologii).** Iu. P. Ozerov, B. V. Permiakov, and V. M. Anferov (Cheliabinskii Politekhnicheskii Institut; Cheliabinskii Meditsinskii Institut, Chelyabinsk, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 60, July 1974, p. 1126-1129. 6 refs. In Russian.

Expressions describing the slow velocity component of the rotary nystagmus are derived. The derivation is based on experimental data, including two sets of electroneurograms (normal and pathological), as well as on well-known vestibular nystagmus models. Quantitative parameter estimates for a rotary nystagmus model, obtained for both normal and pathological conditions with the aid of these expressions, are discussed. M.V.E.

A74-41898 # **Radiobiology and genetics of the arabidopsis plant (Radiobiologiia i genetika arabidopsisa).** V. I. Ivanov. Moscow, Izdatel'stvo Nauka (Problemy Kosmicheskoi Biologii. Volume 27), 1974. 192 p. 390 refs. In Russian.

The arabidopsis plant is a promising object of investigation in the fields of radiobiology, genetics, and space biology. The present work describes the main characteristics of this plant, its growth, and its laboratory study. Methods for genetic crossing are described, taking into account the main types of mutation: morphological, chlorophyllic, and cytoplasmic. A procedure is outlined for establishing a correlation between recorded indices of an induced mutation process and the number of mutations arising in the cells of the embryonic meristem. The somatic and genetic effects of gamma irradiation of the seeds and irradiation by 2 MeV and 5.6 MeV neutrons are investigated, as well as the effects of post-radiation storage and thermal shock. P.T.H.

A74-41922 **Eye movements and visual imagery in free recall.** W. H. Janssen (Instituut voor Zintuigfysiologie RVO-TNO, Soesterberg, Netherlands) and C. F. Nodine. *Acta Psychologica*, vol. 38, Aug. 1974, p. 267-276. 16 refs.

Special equipment with light screens, electrodes and a sliding camera was used in a study of the image-evoking capacity, visual memory and responses in a group of 18 subjects. The eye movement of the subjects were monitored through electrodes when they received repeated acoustic signal series in the form of 24 selected Dutch nouns evoking in them visual images associated with the nouns. Theoretical considerations are given for interpretation of the relations between acoustic signals of this type and the associated eye movement responses. V.Z.

A74-41923 **Aniseikonia. I - The influence of the magnification percentage of afocal meridional lenses on the magnitude of the stereoscopic depth effect. II - The influence of vertical and horizontal aniseikonia on the orientation of longitudinal horopters.** H. C. van der Meer (Nijmegen, Katholieke Universiteit, Nijmegen, Netherlands). *Acta Psychologica*, vol. 38, Aug. 1974, p. 283-314. 32 refs. Research supported by the Nederlandse Organisatie voor Zuiver-Wetenschappelijk Onderzoek.

A74-41924 **Sequential effects in visual search.** T. H. Monk (Nottingham University, Nottingham, England). *Acta Psychologica*, vol. 38, Aug. 1974, p. 315-321. 12 refs.

Two types of repetition effect were demonstrated in a visual search situation. A target dot of one of four possible brightnesses was randomly placed in a field of nontarget dots. A target repetition effect caused search time to be significantly reduced if the trial had a target dot of the same brightness as was used in the immediately preceding trial. An 'edge effect' caused targets in the outer part of the display to have longer search times than those in the inner part. A spatial sequential effect caused targets appearing in the inner part of the display to have reduced search time if the target in the immediately preceding trial had also appeared in the inner part. Possible implications and mechanisms of the sequential effects are discussed. (Author)

A74-41925 **Adding and averaging angles - Comparison of haptic-visual and visual-visual information integration.** G. Stanley (Melbourne, University, Melbourne, Australia). *Acta Psychologica*, vol. 38, Aug. 1974, p. 331-336. 14 refs. NSF Grant No. GB-21028; Grant No. NIH-MH-15828.

A74-41948 # **Dependence of the responses of central auditory neurons on frequency modulation depth and rate (Zavisimost' reaktsii tsentral'nykh slukhovykh neironov ot glubiny i skorosti chastotnoi moduliatsii).** I. A. Vartanian (Akademiia Nauk SSSR, Institut Evoliutsionnoi Fiziologii i Biokhimii, Leningrad, USSR). *Neirofiziologiia*, vol. 6, July-Aug. 1974, p. 350-358. 16 refs. In Russian.

A74-41949 # **The human operator during spaceflight (Chelovek-operator v kosmicheskom polete).** E. V. Khrunov, L. S. Khachatur'iants, V. A. Popov, and E. A. Ivanov. Moscow, Izdatel'stvo Mashinostroenie, 1974. 404 p. 156 refs. In Russian.

The present work investigates the psychological and physiological factors which affect the astronaut's operating capacity in outer space during orbital flight, interplanetary flight, and actual sojourn on another planet. Experiments designed for the training of astronauts in weightless and referenceless space are described. Special emphasis is placed on studying the visual and motor functions of an astronaut. Safety factors in activities outside the spacecraft are

considered, and the effect of protective measures on the astronaut's capacity to function is studied. Investigations into the emotional stresses of an astronaut during flight are discussed. P.T.H.

A74-42043 # **Human power production in a caged situation.** W. J. Anderson (Michigan, University, Ann Arbor, Mich.) and E. F. Weener. *AIAA, MIT, and SSA, International Symposium on the Technology and Science of Low Speed and Motorless Flight, 2nd, Cambridge, Mass., Sept. 11-13, 1974, AIAA Paper 74-1027.* 10 p.

Mechanical efficiencies are calculated for a human doing work in a standing and stooping cycle while enclosed in a cage. An unsteady force is generated which does useful work in oscillating the cage on its suspension system. Such a vertical pumping motion has been proposed for a man-powered ornithopter. Analog simulation reveals that square wave force excitation is more efficient than sinusoidal or triangular. Design curves show some unexpected requirements for matching man and machine, and very poor efficiency if care is not taken. Losses are due to gravity and human inability to store energy in unloading portions of the cycle. A spring-dashpot suspension allows efficiencies of up to 88% in cases involving sinusoidal excitation. A freely floating suspension (the flight situation) allows only 64% efficiency for harmonic excitation. (Author)

A74-42062 * # **Cluster man/system design requirements and verification.** H. H. Watters (NASA, Marshall Space Flight Center, Man-Systems Integration Branch, Huntsville, Ala.). *American Astronautical Society, Annual Meeting, 20th, Los Angeles, Calif., Aug. 20-22, 1974, Paper 74-108.* 10 p. 7 refs.

Discussion of the procedures employed for determining the man/system requirements that guided Skylab design, and review of the techniques used for implementing the man/system design verification. The foremost lesson learned from the design need anticipation and design verification experience is the necessity to allow for human capabilities of in-flight maintenance and repair. It is now known that the entire program was salvaged by a series of unplanned maintenance and repair events which were implemented in spite of poor design provisions for maintenance. M.V.E.

A74-42064 * # **Skylab contamination control.** C. M. Davis (NASA, Marshall Space Flight Center, Huntsville, Ala.). *American Astronautical Society, Annual Meeting, 20th, Los Angeles, Calif., Aug. 20-22, 1974, Paper 74-110.* 22 p. 5 refs.

The optical contamination control systems of Skylab are reviewed, covering contamination sources, critical elements, flight hardware configuration, contamination monitoring sensors, mathematical contamination prediction models, contamination cloud and deposition models, and hardware implementation. Also considered are supportive contamination tests, contamination mission support activities, Skylab contamination evaluation, contamination measurement experiments, and the effectiveness of contamination control measures. Sources of contamination are identified, Skylab system susceptibility to contamination is determined, and predictions are made for surface contamination deposition and background brightness levels. Mission evaluation results indicate that, barring anomalous conditions, Skylab mission equipment and activities are adequate to reduce the general contamination level to the sensitivity threshold levels for experiments and affected subsystems. V.Z.

A74-42071 * # **Skylab extravehicular activity.** D. C. Schultz, R. R. Kain, and R. S. Millican (NASA, Johnson Space Center, Crew Training and Procedures Div., Houston, Tex.). *American Astronautical Society, Annual Meeting, 20th, Los Angeles, Calif., Aug. 20-22, 1974, Paper 74-120.* 40 p.

The use of extravehicular activity (EVA) techniques during the Skylab program for accomplishing major mission objectives and major and minor repair work outside the Skylab workshop is discussed. There were ten EVA periods during Skylab that lasted 82.5 man-hr. Accomplishments included those planned before the mission; but, more important, the Skylab mission was saved by EVA. The life-giving solar wing was erected during the first manned Skylab mission, and the permanent solar shield was erected during the second manned Skylab mission. In addition, 18 extra mission objectives and 13 in-flight repair tasks were accomplished through EVA during the Skylab missions. (Author)

A74-42072 * # **Skylab EVA system development.** R. T. Heckman (NASA, Marshall Space Flight Center, Huntsville, Ala.). *American Astronautical Society, Annual Meeting, 20th, Los Angeles, Calif., Aug. 20-22, 1974, Paper 74-121.* 14 p.

The Skylab EVA hardware design from initial conceptual development to final flight configuration is reviewed, the major concepts which were considered during design evolution are identified, and the reasons for the acceptance or rejection of these concepts are discussed. Man/system simulations played a vital part in the decision-making process. The types of developmental simulation used are discussed, as well as their role in providing design information. The developmental protocol of interleaving analyses and simulations on an iterative basis provided Skylab with a conservative, flexible, and simple EVA system which was effective not only for the nominal mission but for many contingency activities as well. (Author)

A74-42078 * # **Skylab Experiment M487 - Habitability/Crew Quarters.** C. C. Johnson (NASA, Johnson Space Center, Spacecraft Design Div., Houston, Tex.). *American Astronautical Society, Annual Meeting, 20th, Los Angeles, Calif., Aug. 20-22, 1974, Paper 74-133.* 20 p.

It was the purpose of Experiment M487, Habitability/Crew Quarters, to evaluate the effectiveness of the habitability provisions of Skylab for the benefit of designers of future spacecraft. Some of the more interesting findings in the areas of internal environment, architectural arrangements, mobility and restraint aids, food, clothing, personal hygiene, housekeeping, communication between crewmen, and off-duty activities equipment are discussed. (Author)

A74-42079 * # **Skylab Experiment M516 - Crew Activities/Maintenance Study.** R. L. Bond (NASA, Johnson Space Center, Spacecraft Design Div., Houston, Tex.). *American Astronautical Society, Annual Meeting, 20th, Los Angeles, Calif., Aug. 20-22, 1974, Paper 74-134.* 15 p.

Skylab required daily movement about the interior of a 340 cu m vehicle and the handling and transfer of numerous loose items. Planned and unplanned maintenance tasks were also included in the daily routine of activity. Experiment M516, Crew Activities/Maintenance Study, involved an investigation of crew activity during routine daily operations. The overall objective was to secure in-flight data relevant to the performance of tasks in the weightless environment. This paper will present an evaluation of man's ability to handle and transport items of various sizes and masses (logistics management) and to make equipment repairs (maintenance). Results and conclusions are based on subjective crew comments, motion-picture film, and television transmissions. (Author)

A74-42080 * # **An evaluation of Skylab habitability hardware.** J. Stokes (NASA, Marshall Space Flight Center, Huntsville, Ala.). *American Astronautical Society, Annual Meeting, 20th, Los Angeles, Calif., Aug. 20-22, 1974, Paper 74-135.* 19 p. 6 refs.

For effective mission performance, participants in space missions lasting 30-60 days or longer must be provided with hardware to accommodate their personal needs. Such habitability hardware was provided on Skylab. Equipment defined as habitability hardware was that equipment composing the food system, water system, sleep system, waste management system, personal hygiene system, trash management system, and entertainment equipment. Equipment not specifically defined as habitability hardware but which served that function were the Wardroom window, the exercise equipment, and the intercom system, which was occasionally used for private communications. All Skylab habitability hardware generally functioned as intended for the three missions, and most items

could be considered as adequate concepts for future flights of similar duration. Specific components were criticized for their shortcomings. (Author)

A74-42081 * # **Design, development, and operation of a zero gravity shower.** R. L. Middleton, A. C. Krupnick, J. C. Reily, and B. J. Schrick (NASA, Marshall Space Flight Center, Huntsville, Ala.). *American Astronautical Society, Annual Meeting, 20th, Los Angeles, Calif., Aug. 20-22, 1974, Paper 74-136.* 20 p.

The high mission penalty associated with water and electrical power usage constrained the shower configuration concept for the Skylab project to a procedure in which water is sprayed on the body to wet down and soaping is accomplished without water flow. The soap is then finally rinsed off. Initial concept confirmation tests are discussed along with details of the flight shower configuration, the shower water bottle, the shower stall assembly, the liquid-gas separator, the collection box and bag assembly, the hydrophobic filter assembly, and the soap dispenser. Aspects of microbial evaluation of flight qualification hardware are also considered. G.R.

A74-42082 * # **Skylab experiment M509: Astronaut maneuvering equipment - Orbital test results and future applications.** C. E. Whitsett, Jr. and B. McCandless, II (NASA, Johnson Space Center, Houston, Tex.). *American Astronautical Society, Annual Meeting, 20th, Los Angeles, Calif., Aug. 20-22, 1974, Paper 74-137.* 33 p. 5 refs.

A74-42083 * # **Skylab Experiment T020 preliminary results concerning a foot-controlled maneuvering unit.** D. E. Hewes (NASA, Langley Research Center, Hampton, Va.). *American Astronautical Society, Annual Meeting, 20th, Los Angeles, Calif., Aug. 20-22, 1974, Paper 74-138.* 37 p.

Skylab Experiment T020 was developed to study the performance capabilities of astronauts using a relatively simple device maneuvering in an actual zero gravity environment. The experimental test bed, used as the maneuvering unit, employed foot-operated controls for translation along only the vertical or head-to-foot axis and for rotation about all three axes. The control thrusters were operated by direct mechanical linkage to the foot controls, and no stabilization system was employed. The results showed that subjects could successfully perform a number of relatively simple maneuvers but had some difficulties with unplanned or unrehearsed maneuvers of a more complex nature. Precise maneuvering within the confines of the orbital workshop was limited primarily by an inadequate body-restraint harness system and by lack of translation capability along the other two axes. (Author)

A74-42084 * # **Investigation of crew motion disturbances on Skylab-Experiment T-013.** B. A. Conway (NASA, Langley Research Center, Hampton, Va.). *American Astronautical Society, Annual Meeting, 20th, Los Angeles, Calif., Aug. 20-22, 1974, Paper 74-139.* 21 p. 8 refs. Contract No. NAS1-12734.

Astronaut crew motions can produce some of the largest disturbances acting on a manned spacecraft which can affect vehicle attitude and pointing. Skylab Experiment T-013 was developed to investigate the magnitude and effects of some of these disturbances on the Skylab spacecraft. The methods and techniques used to carry out this experiment are discussed, and preliminary results of data analysis presented. Initial findings indicate that forces on the order of 300 N were exerted during vigorous soaring activities, and that certain experiment activities produced spacecraft angular rate excursions 0.03 to 0.07 deg/sec. Results of Experiment T-013 will be incorporated into mathematical models of crew-motion disturbances, and are expected to be of significant aid in the sizing, design, and analysis of stabilization and control systems for future manned spacecraft. (Author)

A74-42109 * # **Skylab food system.** W. H. Bush (NASA, Johnson Space Center, Bioengineering Systems Div., Houston, Tex.). *American Astronautical Society, Annual Meeting, 20th, Los Angeles, Calif., Aug. 20-22, 1974, Paper 74-173.* 25 p.

The Skylab food program was a major effort involving a complex spectrum of activities necessary for the preparation of a crew feeding system. Approximately 17,000 individual food packages and support items, weighing more than 1225 kg, were launched into space as a single unit on board the orbital workshop. This unit provided the three (three-man) Skylab crews with nourishing foods and beverages for a total of 156 days, as well as with eating utensils and accessory items. Additionally, provisions for 5 days (15 man-days) were provided in each of the three command and service modules in a manner similar to that of the Apollo flights. The Skylab food system not only provided the crew with a palatable balanced diet in a familiar and acceptable manner but also supported the formidable mineral balance medical experiment series (M070). (Author)

A74-42110 * # **Skylab biomedical hardware development.** W. J. Huffstetler, Jr. and J. D. Lem (NASA, Johnson Space Center, Bioengineering Systems Div., Houston, Tex.). *American Astronautical Society, Annual Meeting, 20th, Los Angeles, Calif., Aug. 20-22, 1974, Paper 74-174.* 21 p.

The development of hardware to support biomedical experimentation and operations in the Skylab vehicle presented unique technical problems. Designs were required to enable the accurate measurement of many varied physiological parameters and to compensate for zero g such that uninhibited equipment operation would be possible. Because of problems that occurred during the orbital workshop launch, special tests were run and new equipment was designed and built for use by the first Skylab crew. Design concepts used in the development of hardware to support cardiovascular, pulmonary, vestibular, body, and specimen mass measuring experiments are discussed. Additionally, major problem areas and the corresponding design solutions, as well as knowledge gained that will be pertinent for future life sciences hardware development, are presented. (Author)

A74-42111 * # **Skylab medical technology utilization.** J. C. Stonesifer (NASA, Johnson Space Center, Bioengineering Systems Div., Houston, Tex.). *American Astronautical Society, Annual Meeting, 20th, Los Angeles, Calif., Aug. 20-22, 1974, Paper 74-175.* 19 p.

To perform the extensive medical experimentation on man in a long-term, zero-g environment, new medical measuring and monitoring equipment had to be developed, new techniques in training and operations were required, and new methods of collecting and analyzing the great amounts of medical data were developed. Examples of technology transfers to the public sector resulted from the development of new equipment, methods, techniques, and data. This paper describes several of the examples that stemmed directly from Skylab technology. (Author)

A74-42112 * # **Evaluation of life in Skylab from a medical viewpoint.** J. R. Hordinsky (NASA, Johnson Space Center, Health Services Div., Houston, Tex.). *American Astronautical Society, Annual Meeting, 20th, Los Angeles, Calif., Aug. 20-22, 1974, Paper 74-176.* 10 p.

The Skylab program established the opportunity for the first time to perform extensive medical experimentation on man in a long-term zero-g environment. This experimentation involved metabolic studies, cardiovascular systems, nutrition and mineral balance, hematology, vestibular function, and many other related investigations. This report presents an overview of the significant results of the medical experiments performed during the program and a summary of the medical observations gathered by the team of life scientists. (Author)

A74-42113 * # **Skylab medical operational support.** G. R. Primeaux and F. R. Spross (NASA, Johnson Space Center, Operational Systems and Planning Branch, Houston, Tex.). *American Astronautical Society, Annual Meeting, 20th, Los Angeles, Calif., Aug. 20-22, 1974, Paper 74-177.* 27 p.

To support the medical research and the maintenance of crew health during the three Skylab missions, a medical operational support team was organized. The functions of this team ranged from medical data management to medical systems engineering monitoring during the flights. The capability to expand preflight and postflight medical research and analysis was supplied through the use of the Skylab mobile laboratories. These mobile laboratories were not only capable of being transported to the recovery ship for postflight use, but also served as a preflight test area for gathering crewman baseline data. The laboratories contained experiment hardware identical to that of the flight orbital workshop and a laboratory diagnostic facility that duplicated many of the capabilities of ground-based clinical laboratories. (Author)

A74-42341 Fixation point measurement by the Oculometer technique. J. Merchant (Honeywell Radiation Center, Lexington, Mass.). *Optical Engineering*, vol. 13, July-Aug. 1974, p. 339-342.

In this paper, we describe an Oculometer which is an electro-optical device that measures eye direction (and fixation point coordinates) without attachment to, or clamping of, the subject. By virtue of its special optical characteristics, the same basic system can be configured for operation very close to the subject, as in a head mounted system, and also at a distance of several feet or more from the subject. The basic signal processing operation is the same for all configurations, and is performed by a standard minicomputer. It is also shown that additional signal processing, as required in certain configurations and applications, can be added as a separate software module to the general Oculometer software. (Author)

A74-42418 On the use of quartz crystal microbalances for the measurement of spacecraft contamination. D. Wallace (CELESCO Industries, Inc., Costa Mesa, Calif.). In: International Symposium on Space Technology and Science, 10th, Tokyo, Japan, September 3-8, 1973, Proceedings. Tokyo, AGNE Publishing, Inc., 1973, p. 621-630.

Spacecraft component degraded performance or failure as a result of contamination is discussed and sources and mechanisms of returning contamination to the spacecraft are considered. The principle of operation of the quartz crystal microbalance (QCM) is presented, and performance criteria are considered for spacecraft applications. Different approaches to measuring techniques with the QCM are discussed, and design criteria are established. Skylab flight data are presented, and significant mass additions are considered. Contamination during vehicle launch is illustrated as well as frequency transients caused by solar irradiance on the QCM. The QCM is shown to be an excellent method of studying contamination on spacecraft. (Author)

A74-42491 Basic measures to be observed by rats in space flight. S. Sugimoto (Nagoya University, Nagoya, Japan). In: International Symposium on Space Technology and Science, 10th, Tokyo, Japan, September 3-8, 1973, Proceedings. Tokyo, AGNE Publishing, Inc., 1973, p. 1281-1285.

The present study examines some of the reasons why animal participants have failed the operant tasks during space flight. With using two kinds of sensory stimuli and observing EEG and respiration, the following psychological phenomena were observed in rats. When animals were sensitized by an environmental aversive stimulus, N2 wave of brain evoked potentials induced by a single light flash increased in amplitude. After rats had habituated to the repeated strong stimulus, after-discharge on background EEG was observed. Before appearance of the after-discharge, the rats could not perform the operant task. Expectatory emotional response during presentation of warning stimulus followed by an aversive stimulus were observed as marked change of respiration pattern. However, this expectatory response made the rats set to prepare for the coming aversive stimulus. It is important to apply this finding to an animal participant in space during which a great change of environment will occur. (Author)

A74-42492 Spacecraft waste management system using radioisotope heaters. R. W. Shivers (AEC, Isotopes Development Division of Applied Technology, Washington, D.C.) and R. W. Murray (GE Space Center, Valley Forge, Pa.). In: International Symposium on Space Technology and Science, 10th, Tokyo, Japan, September 3-8, 1973, Proceedings. Tokyo, AGNE Publishing, Inc., 1973, p. 1287-1293. Contract No. AT(11-1)-3036.

The present work describes a system representing the first integrated approach to the waste and water management problem for advanced space vehicles. The unit collects and processes the human wastes from four men, including urine, feces, wash water, and trash, recovers the water, and disposes of the solid wastes. The processes utilized are distillation at 49 C and catalytic oxidation at 649 C to purify the water, and incineration at 649 C to dispose of the solids. Electrical power requirements are minimized by use of a specially developed radioisotope heaters of 420 watts for the high temperature processes and a modified 850-watt heater for the distillation process. (Author)

A74-42493 Preliminary experiments for fish biosatellite. G. Mitarai, T. Nagasaka, H. Jijiwa, S. Mori, and S. Takagi (Nagoya University, Nagoya, Japan). In: International Symposium on Space Technology and Science, 10th, Tokyo, Japan, September 3-8, 1973, Proceedings. Tokyo, AGNE Publishing, Inc., 1973, p. 1295-1299.

Some species of fish can be kept alive long even in a limited aquarium with little oxygen and food, and are supposed to be suitable subjects to investigate hypogravic effects on postural attitudes (Baumgartner et al., 1972). Using carp and goldfish, we are attempting to design a fish biosatellite. The present investigation is concerned with finding suitable conditions of the sealed water tank and tolerance of these fishes to acceleration. Goldfish fixed in a body-shaped tube showed no apparent weakness for several hours in the tank of 4.5 liters at water temperature of 15 C, if the water was aerated before sealing, showing heart rate of 60 pm and respiration of 120 pm. Under these conditions, many fish could tolerate tailward acceleration and deceleration loaded for ten minutes up to 7 G. (Author)

A74-42494 Effects of lower body negative pressure /LBNP/ on the resistance and the capacitance vessels of the forearm. T. Nagasaka and G. Mitarai (Nagoya University, Nagoya, Japan). In: International Symposium on Space Technology and Science, 10th, Tokyo, Japan, September 3-8, 1973, Proceedings. Tokyo, AGNE Publishing, Inc., 1973, p. 1301-1305. 15 refs. Ministry of Education Grant No. 67004.

Blood flow, venous compliance, and arm circumference in the forearm were measured with mercury-in-rubber strain gauges during 40 mm Hg lower body negative pressure (LBNP). The subjects were exposed, in separate experiments, to 30 minutes of LBNP at ambient temperatures of 20, 23, 26, and 29 C. In pre-LBNP phase, venous compliance was roughly the same at all four temperatures. During LBNP, venous compliance decreased considerably at 20-23 C. Effects of hydrostatic stress on the capacitance vessels seemed to be greatly influenced by a small change in temperature. Blood flow, reduced proportionally with decreasing temperature in control, decreased markedly during LBNP at all four temperatures. Forearm circumference decreased considerably during LBNP. With LBNP release, the volume of the arm returned to near control levels within 2-4 minutes and decreased slightly thereafter. During this period, both forearm blood flow and blood pressure increased. (Author)

A74-42495 Whole body oxygen consumption during hypoxic hypoxemia and cardiopulmonary bypass circulation. R. B. Shepard (Alabama, University, Birmingham, Ala.). In: International Symposium on Space Technology and Science, 10th, Tokyo, Japan, September 3-8, 1973, Proceedings. Tokyo, AGNE Publishing, Inc., 1973, p. 1307-1318. 19 refs. Research supported by the U.S. Veterans Administration Surgical and Medical

Services; Grants No. NIH-HE-9423; No. NIH-HE-11310.

Whole body oxygen consumption as a function of arterial blood oxygen levels and acid-base status was determined in 17 anesthetized dogs during cardiopulmonary bypass circulation at 37 C. Ventilation and disc surface area of the oxygenator were varied systematically to produce arterial blood hemoglobin oxygen saturations ranging from 98.5 to 25% and carbon dioxide tensions from 21 to 100 mm Hg. The data show that oxygen consumption increased 19% as arterial blood oxygen saturation decreased from 98% to 65%, or 10% as arterial blood oxygen content decreased from 90-150 cc/L to 70-90 cc/L. Only after arterial saturation become less than 65% and venous oxygen tension about 25 mm Hg or less, did oxygen consumption reduce below levels existing prior to onset of arterial desaturation. Conclusion is that under these conditions of hypoxic hypoxemia, whole body oxygen consumption rises when arterial desaturation occurs, and then falls rapidly after venous oxygen tensions of about 20-25 mm Hg are reached. (Author)

A74-42496 Bioenergetic and kinetic study on human locomotion at simulated hypogravics. H. Saiki, M. Nakaya, H. Mizunuma, T. Yamauchi, Y. Sugita, Y. Moribe, T. Hosoi (Tokyo Jikeikai Ika Daigaku University, Tokyo, Japan), M. Nagatomo, T. Araki, and Y. Hashimoto (Tokyo, University, Tokyo, Japan). In: International Symposium on Space Technology and Science, 10th, Tokyo, Japan, September 3-8, 1973, Proceedings. Tokyo, AGNE Publishing, Inc., 1973, p. 1319-1326. 7 refs.

Using Yushiya-type hypogravic simulating suspension apparatus and platforms with three-direction accelerometers, kinetic data on the locomotion of two human subjects were obtained under normogravic and hypogravic conditions (Martian and lunar conditions) while respiratory gasometry was simultaneously performed. From the energetic and kinetic data, efficiency of locomotion at different speeds and of vertical jumping was calculated. Locomotion in normogravics at 0-6 km/hr speed gave approximately the same energy consumption value as the standard value. At 7-8 km/hr running speed, energy consumption and efficiency in hypogravics were less than in normogravics. Energy consumption during vertical jumping in hypogravics was clearly smaller than that in normogravics, while energetic efficiency of vertical jumping in hypogravics was lower than that in normogravics. P.T.H.

A74-42527 A scale of human reaction to whole body, vertical, sinusoidal vibration. A. J. Jones and D. J. Saunders (Salford, University, Salford, Lancs., England). *Journal of Sound and Vibration*, vol. 35, Aug. 22, 1974, p. 503-520. 13 refs. Research supported by the Science Research Council.

A relative intensity estimation procedure has been to obtain observers' estimates of the subjective growth of whole-body, vertical, sinusoidal vibration intensity for both men and women in an unrestrained sitting position and for men in a standing position. The results show that, at each frequency used, individual subjects are able to make consistent judgements and that the growth functions are of the Stevens power law form. Because of the small effect on the results of subject sex and experimental posture, a general power law of the form $Y = kX$ to the 0.93 power, where Y represents the subjective magnitude and X the objective acceleration magnitude, is proposed to describe human reaction to sinusoidal vibration intensity in the frequency ranges from 5 to 80 Hz. This power law has been used to construct a set of equal comfort contours, an empirically determined contour being used as a basis, and it is shown that there is good agreement between the measured and predicted contours. (Author)

A74-42544 # Numerical simulation of the blood flow through the brain (Cislicova simulace proudeni krve mozkem). J. Nevrly (Podnik Vypocetni Techniki, Brno, Czechoslovakia) and P. Nadvornik (Neurologicka Klinika LFUK, Bratislava, Czechoslovakia). *Automatizace*, vol. 17, June 1974, p. 156-158. In Czech.

Consideration of the use of a mathematical model to choose suitable blood vessels for an artificial anastomosis to improve the cerebral blood supply in patients in whom certain cerebral blood vessels are blocked. The model used for simulating the blood flow through the brain is that developed by Himwich and Clark (1971) with reference to the Willis circle. In this model the fluctuating current is replaced by a steady current, and elastic arteries are replaced by rigid pipes. The results of a numerical simulation of the blood flow through the brain in FORTRAN IV language are presented. A.B.K.

A74-42646 # Mathematical methods of chronoamperogram analysis (Matematichni metodi analizu khronoamperogram). P. V. Beloshits'kii, Iu. I. Petunin, and L. I. Iakut (Akademiia Nauk Ukrains'koi RSR, Institut Fiziologii, Kiev, Ukrainian SSR). *Fiziologichnii Zhurnal*, vol. 20, July-Aug. 1974, p. 527-533. In Ukrainian.

Curves describing oxygen depletion in cells of hypoxia-adapted rats and control rats are analyzed. Mathematical models are developed to interpret the oxygen depletion process in both cases, showing smaller oxygen depletion rates in the tissues of adapted rats. Chronoamperograms of the beginning and final phases of the oxygen depletion process are plotted. Oxygen depletion rates in adapted heart and liver tissues are found to follow a certain characteristic law until a low ultimate partial pressure of oxygen is reached. A theory is proposed to explain this process. V.Z.

A74-42647 # Vasomotorial pulmonary reactions during the stimulation of the hypothalamus (Sudinorukhovi reaktsii v legeniakh pri podraznenni gipotalamusa). G. V. Tam (Kiivs'kii Derzhavnii Universitet, Kiev, Ukrainian SSR). *Fiziologichnii Zhurnal*, vol. 20, July-Aug. 1974, p. 545-547. 13 refs. In Ukrainian.

Blood pressure was recorded in the right ventricles and the carotid arteries of anesthetized dogs when their pulmonary arteries were perfused through a catheter with venous blood at constant pressure. Electrical stimulation of various hypothalamic structures caused substantial blood flow fluctuations in the perfused pulmonary segments. The fluctuations are linked to vasomotorial pulmonary reactions to stimulation. V.Z.

A74-42648 # A technique for pulmonary blood flow rate recording (Metodika reestratsii shvidkosti rukhu krovi v legeniakh). V. O. Tsibenko, G. V. Tam, and M. O. Navakatikian (Kiivs'kii Derzhavnii Universitet, Kiev, Ukrainian SSR). *Fiziologichnii Zhurnal*, vol. 20, July-Aug. 1974, p. 556-558. 6 refs. In Ukrainian.

A modified droplet method, involving venous blood perfusion through a catheter without open lung surgery, was applied for blood flow recording in pulmonary blood circulation tests. A photocell was used to obtain tape recordings of blood pressure during the passage of single blood droplets through a capillary at the catheter mouth. The method is applicable to blood flow recordings in blood vessels with blood flow rates up to 30 to 40 ml/min. V.Z.

A74-42649 Monitoring small eye movements with averaged EOG. R. L. Colegate and J. E. Hoffman (Illinois, University, Champaign, Ill.). *Psychonomic Society, Bulletin*, vol. 4, Aug. 1974, p. 149-151. Grant No. PHS-MH-1206.

Electrooculograms (EOG) have long been used to record large eye movements in a relatively free situation. EOGs to eye movements of 1 deg of visual angle or less have only been recorded where a bitebar has been used or where the external epidermis has been removed to reduce background electrical activity (Schackel, 1961). In the experimental setting described, eye movements of 1 deg of visual angle must be monitored without the use of a bitebar or abrasive skin preparation. In the present study, the feasibility of using an averaged EOG in this experimental setting was determined. The rationale is as follows. A single EOG contains the DC shift in polarity of the corneal-retinal potential as well as the background activity which may frequently obscure that due to a small eye movement. If it is assumed that only the former is time-locked to the

stimulus, then the background activity will have a mean of zero at any point in time during the averaging epoch when averaged over several trials. That portion of the EOG due to the change in the corneal-retinal potential will have the same polarity at every point in time on each trial, and the averaged record will represent its mean amplitude. F.R.L.

A74-42664 # **Biological effects of the ultrahard cosmic ray component (O biologicheskom deistvii sverkhzhestkoi komponenty kosmicheskogo izlucheniia).** I. G. Akoev, S. S. Turov, G. A. Leont'eva, I. A. Livanova, and A. Kh. Akhmadieva. *Kosmicheskie Issledovaniia,* vol. 12, July-Aug. 1974, p. 617-624. 37 refs. In Russian.

Secondary emission generated at a target by 70 GeV protons, and consisting primarily of hadrons, was used in a model study of the biological effect of the ultrahard component. A high biological effectiveness is revealed and is attributed to the multiplicity of secondary-particle production, the narrow angular distribution of the secondary particles, and the probability of multiply charged ion production. V.P.

A74-42672 The 'in vivo' and 'in vitro' CO2-equilibration curves of blood during acute hypercapnia and hypocapnia. I - Experimental investigations. D. Böning, U. Schweigart, V. Nutz, and J. Stegemann (Deutsche Sporthochschule, Cologne, West Germany). *Pflügers Archiv,* vol. 350, no. 3, 1974, p. 201-212. 42 refs. Translation. Deutsche Forschungsgemeinschaft Contract No. Bo-360/1.

A74-42673 The 'in vivo' and 'in vitro' CO2-equilibration curves of blood during acute hypercapnia and hypocapnia. II - Theoretical considerations. D. Böning (Deutsche Sporthochschule, Cologne, West Germany). *Pflügers Archiv,* vol. 350, no. 3, 1974, p. 213-222. 20 refs.

A74-42674 Cardiac hypertrophy in the first generation of rats native to simulated high altitude - Muscle fiber diameter and diffusion distance in the right and left ventricle. M. Grandtner, Z. Turek, and F. Kreuzer (Nijmegen, Katholieke Universiteit, Nijmegen, Netherlands). *Pflügers Archiv,* vol. 350, no. 3, 1974, p. 241-248. 16 refs.

A74-42675 Hysteresis in the static characteristics of eye position coded neurons in the alert monkey. R. Eckmiller (Berlin, Freie Universität, Berlin, West Germany). *Pflügers Archiv,* vol. 350, no. 3, 1974, p. 249-258. 21 refs. Research supported by the Deutsche Forschungsgemeinschaft; Grant No. PHS-EY-00592.

A74-42829 Space radiation biology and related topics. Edited by C. A. Tobias (California, University, Berkeley, Calif.) and P. Todd (Pennsylvania State University, University Park, Pa.). New York, Academic Press, Inc., 1974. 655 p. $33.

Following a historial survey of space radiation biology, radiation physics and evaluation of current hazards, solar electromagnetic radiation, and particle irradiation methods are discussed. Attention is given to cellular radiation biology, radiation and molecular and biological evolution, magnetic fields and their biological effects, and relevant principles of magnetism and biomagnetics. Results of radiobiological experiments on satellites, mammalian radiobiology and space flight, circadian rhythmometry of mammalian radiosensitivity, human radiation tolerance, mathematical models of mammalian radiation response for space applications, cell kinetics and radiation recovery models, and current topics in space radiation biology are dealt with. F.R.L.

A74-42830 Historical survey of space radiation biology. C. A. Tobias (California, University, Berkeley, Calif.) and P. Todd (Pennsylvania State University, University Park, Pa.). In: Space radiation biology and related topics. New York, Academic Press, Inc., 1974, p. 1-20. 67 refs.

Ionizing radiations in space and their effects on life are reviewed in a historical perspective. The discovery and composition of cosmic radiation from beyond the earth are discussed, along with the prediction, discovery, and composition of the radiation belts around the earth. The prediction and observation of the solar wind and the nature of high-energy particles from the sun are also discussed. Early predictions and later studies of space radiation hazards are described, and biological effects of cosmic rays are considered in the light of space radiation experiments on the ground. The role of space radiations in chemical and biological evolution is briefly assessed. M.V.E.

A74-42831 Radiation physics and evaluation of current hazards. S. B. Curtis (California, University, Berkeley, Calif.). In: Space radiation biology and related topics. New York, Academic Press, Inc., 1974, p. 21-99. 130 refs.

Major attention is given to the interaction of radiation with a shielding system and the resulting levels found within a spacecraft. This treatment includes only those aspects of the radiation environment relevant to hazard evaluation, without dealing with the ultimate effects on man. Following a brief introduction to the space radiation environment, the manner in which the various particles lose energy and thus deposit dose are reviewed. Then, for each source of radiation, recent experimental results and calculations of energy spectra, energy loss distributions (LET spectra) and doses and dose rates inside various spacecraft configurations are reviewed. Included is a summary of radiation measurements from the U.S. manned missions (Mercury, Gemini, and early Apollo). After brief reviews of a promising active shielding concept and the radiation environments around several of the planets, the chapter concludes with a summary of evaluation of the progress. F.R.L.

A74-42833 Particle irradiation methods. M. R. Raju (California, University, Los Alamos, N. Mex.), J. T. Lyman, and C. A. Tobias (California, University, Berkeley, Calif.). In: Space radiation biology and related topics. New York, Academic Press, Inc., 1974, p. 115-140. 57 refs.

A logical way of proceeding in space radiobiological studies is to study the effects of particles in accelerators at ground level. The major solar particles, electrons, protons, and helium ions, have been accelerated in a number of machines to all pertinent energies that occur in solar flares and in the radiation belt. Some of the heavier ions have also been accelerated to relatively low energies sufficient to study some molecular and cellular effects. For the future, several methods of acceleration are under development that will allow scientists to accelerate virtually all stable nuclei in the periodic table to energies of several hundred million electron volts per nucleon at sufficiently high fluxes to make rapid progress in heavy-ion radiobiology possible. F.R.L.

A74-42834 Cellular radiation biology. P. Todd (Pennsylvania State University, University Park, Pa.) and C. A. Tobias (California, University, Berkeley, Calif.). In: Space radiation biology and related topics. New York, Academic Press, Inc., 1974, p. 141-195. 164 refs.

It is necessary to omit many aspects of the general subject of radiobiology and to place emphasis only on the most relevant - namely, those studies which lead to an understanding of the actions of ionizing particulate (including high LET) and ultraviolet radiations and some aspects of the physiological sequelae of ionizing radiation that are, in general, applicable to the human situation. Physical theories of inactivation, fundamental radiation chemistry of condensed phases, phylogenetic radiobiology, modification of radiation action, biological effects of particulate radiations, and heavy-particle irradiation of molecules of biological interest are discussed. Attention is given to small molecules, nuclei acids, enzymes, and many other subjects. F.R.L.

A74-42835 **Radiation and molecular and biological evolution.** C. A. Tobias (California, University, Berkeley, Calif.) and P. Todd (Pennsylvania State University, University Park, Pa.). In: Space radiation biology and related topics. New York, Academic Press, Inc., 1974, p. 197-255. 240 refs.

The aim of this section is to describe the radiations incident upon the upper atmosphere and their physical and chemical interactions and to suggest relevant influences exerted in the biosphere by these interactions, past and present. Entities involved in these interactions are the ionosphere, the ozonosphere, aurorae, and other visible atmospheric phenomena. The electromagnetic and particulate emissions of the sun were described elsewhere. However, most of these emissions are not seen at ground level because of their nearly total absorption in the upper atmosphere. The transmissivity of the upper atmosphere is essentially nil for all wavelengths of electromagnetic radiation with the notable exception of visible light and shortwave radio. Thus, the solar X-ray and ultraviolet (UV) lines and continua are totally absorbed high up in the atmosphere by the predictable mechanism of ionization, excitation, and subsequent chemical reaction. F.R.L.

A74-42836 **Magnetic fields and their biological effects.** I. L. Silver and C. A. Tobias (California, University, Berkeley, Calif.). In: Space radiation biology and related topics. New York, Academic Press, Inc., 1974, p. 257-292. 199 refs.

Orbiting vehicles usually intercept the weak geomagnetic field and the magnetic disturbances that accompany charged particle streams from the sun and the galaxy. The magnetic fields at each planet are different: some evidence is available that Jupiter has an exceedingly high field. In addition, on spaceships there is a variety of sources for magnetic fields. Electrical equipment usually generates only weak, stray fields. Ion propulsion systems proposed for the future may apply sizable fields. Strong magnetic fields have been studied for possible application in the deflection shielding of penetrating charged particles. To ensure the safety and efficient performance of astronauts, as well as to establish the long-range feasibility of space colonization, the scope of biomagnetic interactions must be defined. The purpose of this chapter is to review briefly significant reported effects of magnetic fields on biological systems. Criteria are also suggested that may aid in future discovery and understanding of such effects. F.R.L.

A74-42837 **Relevant principles of magnetism and biomagnetics.** I. L. Silver and C. A. Tobias (California, University, Berkeley, Calif.). In: Space radiation biology and related topics. New York, Academic Press, Inc., 1974, p. 293-312. 44 refs.

Review of the principles of magnetism relevant to magnetic field interactions with biological systems, and discussion of possible molecular mechanisms induced or controlled by magnetic forces and torques. The latter may be able to orient or distort macromolecular complexes, and the ability of a biosystem to acquire a magnetic moment has been demonstrated by recent experiments. Special attention is given to the molecular basis of magnetism, quantum energetics, chemical bonding, and thermodynamics underlying the various types of magnetic field interactions with biological systems. Grouped into electromagnetic effects and magnetomechanical or paramagnetic effects, these magnetic field interactions are examined with respect to the molecular mechanisms they may give rise to. M.V.E.

A74-42838 **Results of radiobiological experiments on satellites.** B. B. Shank (Case-Western-Reserve University, Cleveland, Ohio). In: Space radiation biology and related topics. New York, Academic Press, Inc., 1974, p. 313-351. 46 refs.

Alterations caused by weightlessness on the effect of radiation were, for the most part, in the form of an enhancement of the radiation effect. This is especially noted in the direct genetic studies, in which there is enhancement in a large number of cases involving chromosome breakage and rejoining. Point mutations were unaffected generally, except in the case of Neurospora on Gemini XI in which an antagonism was noted. Two developmental anomalies in irradiated systems (i.e., deformed thorax and missing wing in Drosophila and a wing abnormality in Tribolium) were also enhanced by weightlessness, related very likely to genetic alterations to the egg in the former case and to somatic cells in the latter case. F.R.L.

A74-42839 **Mammalian radiobiology and space flight.** H. Aceto (College of William and Mary, Williamsburg, Va.), J. Leith (California, University, Berkeley, Calif.), and D. Baker (Claire-Zellerbach Saroni Tumor Institute, San Francisco, Calif.). In: Space radiation biology and related topics. New York, Academic Press, Inc., 1974, p. 353-433. 360 refs.

Quantitative data on the effects of radiation on man are not plentiful. Much knowledge about the physiological effects of radiation comes from studies of laboratory mammals. Here the effects of radiations on mammals, with emphasis of those effects pertinent to the space flight situation are discussed. Where information is available, the effects of particulate radiations are compared with those of conventional (X or gamma) radiation. Major syndromes and responses of central organ systems are presented with applications, where appropriate, of findings from cellular studies. F.R.L.

A74-42840 * **Circadian rhythmometry of mammalian radiosensitivity.** E. Haus (St. Paul-Ramsey Hospital and Medical Center, St. Paul, Minn.), F. Halberg (Minnesota, University, Minneapolis, Minn.), M. K. Loken (University of Minnesota Hospitals, Minneapolis, Minn.), and Y. S. Kim (Minnesota, University, St. Paul, Minn.). In: Space radiation biology and related topics. New York, Academic Press, Inc., 1974, p. 435-474. 123 refs. Research supported by the St. Paul-Ramsey Medical Research and Education Foundation; Grants No. PHS-5-K6-GM-13981; No. NGR-24-005-006.

In the case of human bone marrow, the largest number of mitoses is seen in the evening in diurnally active men, mitotic activity being at a minimum in the morning. The opposite pattern is observed for nocturnal animals such as rats and mice on a regimen of light during the daytime alternating with darkness during the night hours. The entirety of these rhythms plays an important role in the organism's responses to environmental stimuli, including its resistance to potentially harmful agents. Conditions under which circadian rhythms can be observed and validated by inferential statistical means are discussed while emphasizing how artifacts of the laboratory environment can be shown to obscure circadian periodic variations in radiosensitivity. F.R.L.

A74-42841 * **Human radiation tolerance.** C. C. Lushbaugh (Oak Ridge Associated Universities, Inc., Oak Ridge, Tenn.). In: Space radiation biology and related topics. New York, Academic Press, Inc., 1974, p. 475-522. 124 refs. AEC-NASA-supported research.

The acute radiation syndrome in man is clinically bounded by death at high dose levels and by the prodromal syndrome of untoward physiological effects at minimal levels of clinically effective exposure. As in lower animals, man experiences principally three acute modes of death from radiation exposure (Bond et al., 1965). These are known collectively as the lethal radiation syndromes: central nervous system death, gastrointestinal death, and hematopoietic death. The effect of multiple exposure on lethality, the effect of multiple exposure on hematopoietic recovery, and quantitative aspects of cell and tissue repair are discussed. F.R.L.

A74-42842 **Mathematical models of mammalian radiation response for space applications.** P. Steward (Washington University, St. Louis, Mo.). In: Space radiation biology and related topics. New York, Academic Press, Inc., 1974, p. 523-564. 55 refs.

The literature on models for recovery from radiation damage to mammals is reviewed, with discussion on mammalian aging models

with special interest in radiation-induced aging. This literature survey is the first step in developing a mathematical formalism to indicate quantitatively the risk or, its opposite, vitality of the space traveler following an arbitrary dose-time schedule. Possible approaches are suggested toward a formalism which requires experimental solutions to some still existing problems. The literature is reviewed on models for recovery from radiation damage to some cellular systems. F.R.L.

A74-42843 **Cell kinetics and radiation recovery models.** P. Steward (Washington University, St. Louis, Mo.). In: Space radiation biology and related topics. New York, Academic Press, Inc., 1974, p. 565-582. 19 refs.

Discussion of analytical and numerical models for cell kinetics involved in radiation injury and recovery. The analytic models are shown to have the advantage of possibly offering some information on cell behavior in the form of a single formula. The numerical models, which are designed strictly for computer operation, have the flexibility of permitting various kinds of manipulation of the cell population. M.V.E.

A74-42844 **Current topics in space radiation biology.** P. Todd (Pennsylvania State University, University Park, Pa.), C. A. Tobias (California, University, Berkeley, Calif.), and I. L. Silver. In: Space radiation biology and related topics. New York, Academic Press, Inc., 1974, p. 583-606. 46 refs.

Three general types of nuclear devices are being designed for power production in space. Radioisotope-powered thermoelectric generators are already in use on long-term instrumented space missions, and some have seen use in the Apollo program. Nuclear reactors as sources of electrical power in space are currently under design. Serious efforts have been made for over a decade to produce a nuclear-reactor-propelled rocket. In all cases large amounts of radioactive material and/or large neutron fluxes are involved, and the problems attendant with handling them safely in space are very large. Dependable sources of electrical energy are essential to instrumented missions in space exploration. Solar energy conversion devices have been eminently successful for this purpose. Attention is given to radiation and weightlessness, phosphenes in space flight, a Soviet view of space radiation hazards and policies, and cosmic abiogenesis. F.R.L.

A74-42893 # **Biological studies in space /some results and outlook/ (Biologicheskie issledovaniia v kosmose /nekotorye itogi i perspektivy/).** O. G. Gazenko, E. A. Il'in, and G. P. Parfenov. *Akademiia Nauk SSSR, Izvestiia, Seriia Biologicheskaia,* July-Aug. 1974, p. 461-475. 34 refs. In Russian.

Soviet biological studies in outer space are reviewed, covering experiments on mammals, turtles, insects, reptiles, plants, microorganisms, and tissue cultures. The effects of space flights on the behavior, central nervous system, cardiovascular system, blood and morphology of mammals are discussed. The findings of experiments with higher plants, insects, reptile eggs, bacteria, and mammal tissues are surveyed. Future trends in space biology are projected. V.Z.

A74-42894 # **Problem of statokinetic stability of man in aerospace medicine (Problema statokineticheskoi ustoichivosti cheloveka v aviatsionnoi i kosmicheskoi meditsine).** V. I. Kopanev. *Akademiia Nauk SSSR, Izvestiia, Seriia Biologicheskaia,* July-Aug. 1974, p. 476-498. 126 refs. In Russian.

The statokinetic stability of man is defined as his capability to preserve stable working capacity, spatial orientation and equilibrium function by adequate physiological function control when exposed to statokinetic stimuli during active and passive motions in space. Soviet published studies on the subject are reviewed with the conclusion that the statokinetic stability of man is affected adversely by hypodynamia, high temperatures, weightlessness, and optokinetic stimuli. It increases with age, is higher in male teen-agers than in female teen-agers, and is enhanced by physical exercises. V.Z.

A74-42895 # **Human capability of orientation with respect to the vector of small rectilinear acceleration (Sposobnost' cheloveka orientirovat'sia otnositel'no vektora priamolineinogo uskoreniia maloi velichiny).** F. A. Solodovnik and V. N. Alekseev. *Akademiia Nauk SSSR, Izvestiia, Seriia Biologicheskaia,* July-Aug. 1974, p. 499-505. 11 refs. In Russian.

A group of 22 subjects were instructed to indicate the time they began to perceive a swinging sensation after a period of rotation followed by swinging in various directions, with gradually increasing amplitudes, in a test stand with a chair set in alternating rotating and swinging motions. The average linear acceleration perception threshold of the subjects was 3.6 cm per sq sec, but the vector of linear acceleration was perceived by the subjects correctly only when the acceleration was 11 to 16 cm per sq sec. V.Z.

A74-42896 # **Effect of an electrostatic field on oxyhemoglobin in hybrid white mice (Vozdeistvie elektrostaticheskogo polia na oksigemoglobin belykh besporodnykh myshei).** L. A. Piruzian, G. G. Artsruni, G. V. Romanov, A. M. Melikian, A. D. Kutuzov, and L. Kh. Barsegian (Akademiia Nauk SSSR, Institut Khimicheskoi Fiziki, Moscow, USSR). *Akademiia Nauk SSSR, Izvestiia, Seriia Biologicheskaia,* July-Aug. 1974, p. 597-599. 14 refs. In Russian.

A74-42910 **Ultradian rhythms in extended performance.** W. C. Orr, H. J. Hoffman, and F. W. Hegge (U.S. Veterans Administration Hospital; Oklahoma, University, Oklahoma City, Okla.; National Institutes of Health, National Institute of Child Health and Human Development; U.S. Army, Walter Reed Army Institute of Research, Washington, D.C.). *Aerospace Medicine,* vol. 45, Sept. 1974, p. 995-1000. 13 refs.

Eleven healthy, young, male volunteers participated in an experiment which involved continuous monitoring of heart rate and performance on a complex vigilance task. Subjects were instructed to continue in the experiment for 48 hr or until they felt they could go no longer. All subjects completed at least 21 hr and two went for 44 hr. Heart rate and behavioral measures were subjected to complex demodulation analysis to determine the phase and amplitude characteristics of cyclic activity with a period in the range of 90 plus or minus 5 min. The primary findings were a rather marked increase in the amplitude of the 90-min rhythm, in both heart rate and performance measures, as the time on task increased, reaching their highest level near the end of the run. This reponse pattern was found in over three-fourths of the analyses done, and was independent of the total duration of the experiment. It is felt that this marked amplitude rise is indicative of a cumulative stress response. (Author)

A74-42911 **Personality makeup of the American Air Traffic Controller.** S. Karson and J. W. O'Dell (Eastern Michigan University, Ypsilanti, Mich.). *Aerospace Medicine,* vol. 45, Sept. 1974, p. 1001-1007. 13 refs.

Based on scores from the Sixteen Personality Factor Questionnaire, the personality structure of 11,047 persons working as air traffic controllers, and 9886 persons applying for that job, was examined through factor-analytic and analysis-of-variance techniques. It was concluded that air traffic controllers are superior to the general population in all characteristics of personality essential to performance of their work and, further, that applicants for these positions are even better qualified in certain respects. (Author)

A74-42912 **Contaminant analyzer for aircraft oxygen systems.** K. G. Ikels, W. L. Crow, and R. L. Miller (USAF, School of Aerospace Medicine, Brooks AFB, Tex.). *Aerospace Medicine,* vol. 45, Sept. 1974, p. 1008-1012.

Both the routine and special analyses of aviator's breathing oxygen (ABO) are problems faced at all operational flying bases. Presently, there is no base-level analyzer capable of immediately establishing the quality of ABO. A sample must be shipped to an off-base laboratory for analysis. This procedure is admittedly slow, inconvenient, and actually does not determine the quality of ABO

received by the pilot. A portable infrared system has, therefore, been developed that can directly determine the quality of ABO in aircraft, service cart, or bulk supply in 20 min. The analyzer, specifically designed to analyze ABO at the point of delivery to the pilot, performed exceedingly well during laboratory and field tests, including investigation of several physiological incidents and a survey of contaminants in aircraft oxygen systems. (Author)

A74-42913 Flashblindness following double flash exposures. G. T. Chisum and P. E. Morway (U.S. Naval Material Command, Naval Air Development Center, Warminster, Pa.). *Aerospace Medicine,* vol. 45, Sept. 1974, p. 1013-1016.

Times required to detect a simple display were measured following exposure to adapting flashes separated from varying intervals ranging from 2 to 90 sec. The results indicate that for flash durations of 165 microsec, the approximate exposure duration wherein protection equipment is used, there are no consistent variations in response times as a function of interflash interval. (Author)

A74-42914 Fatigue in FB-111 crewmembers. B. O. Hartman, H. B. Hale, and W. A. Johnson (USAF, School of Aerospace Medicine, Brooks AFB, Tex.; USAF, Dispensary, Pease AFB, N.H.). *Aerospace Medicine,* vol. 45, Sept. 1974, p. 1026-1029.

Fifteen biomedically dedicated missions of 8-hr duration were flown in the FB-111 as part of its initial operational evaluation. Each two-man crew provided data on subjective fatigue, discomfort, efficiency, and pre- and postmission sleep. In addition, urine samples obtained from one crew on an unusually demanding mission were analyzed for epinephrine, norepinephrine, 17-hydroxycorticosteroids, sodium, potassium, and urea. The data showed that the crews experienced moderate fatigue and stress, aggravated by physical discomfort, from which they recovered after one night of sleep. (Author)

A74-42915 * Modular liquid-cooled helmet liner for thermal comfort. B. A. Williams and A. Shitzer (NASA, Ames Research Center, Biotechnology Div., Moffett Field, Calif.). *Aerospace Medicine,* vol. 45, Sept. 1974, p. 1030-1036. 19 refs. Contract No. NAS2-6650.

A modular liquid-cooled helmet liner made of eight form-fitting neoprene patches was constructed. The liner was integrated into the sweatband of an Army SPH-4 helicopter aircrew helmet. This assembly was tested on four subjects seated in a hot (47 C), humid (40%) environment. Results indicate a marked reduction in the rate of increase of physiological body functions. Rectal temperature, weight loss, heart rate, and strain indices are all reduced to approximately 50% of uncooled levels. The cooling liner removed from 10% to 30% of total metabolic heat produced. This study also demonstrated the technical feasilibity of using a cooling liner in conjunction with a standard hard helmet. Potential applications of the cooling liner in thermally stressful environments are numerous, notably for helicopter and other aircrews. (Author)

A74-42916 Alterations in number, duration, and frequency of post-rotatory nystagmus beats during hyperbaria and decompression in guinea pigs. C. B. Jensen, S. J. Brumleve, and B. DeBoer (North Dakota, University, Grand Forks, N. Dak.). *Aerospace Medicine,* vol. 45, Sept. 1974, p. 1037-1040. 9 refs. Contract No. N00014-68-A-0499. NR Project 101-753.

A74-42917 * Ultrastructural response of rat lung to 90 days' exposure to oxygen at 450 mm Hg. G. A. Harrison (NASA, Ames Research Center, Moffett Field, Calif.). *Aerospace Medicine,* vol. 45, Sept. 1974, p. 1041-1045. 20 refs.

Young Sprague-Dawley rats were exposed to 100% oxygen at 450 mm Hg in constant environment capsules for 90 days. Lung tissue examined by electron microscopy revealed a number of changes, many similar to those observed after exposure to oxygen at 760 mm Hg for shorter periods of time. Alterations in vesicle size and number and in mitochondrial matrix and cristae appear in both the endothelial and epithelial cells. Blebbing and rarefication of cytoplasm occur in both cell layers of the alveolo-capillary wall. Also seen are fluid in the basement membrane, platelets in the capillaries, and alveolar fluid and debris. All of these alterations occur at 1 atm exposure. However, after exposure to 450 mm Hg the changes are not as widespread nor as destructive as they are at the higher pressure. (Author)

A74-42918 * Medical legacy of Apollo. C. A. Berry (NASA, Washington, D.C.). *Aerospace Medicine,* vol. 45, Sept. 1974, p. 1046-1057. 17 refs.

Since Apollo crews enjoyed freedom of movement and experienced many of the same problems as earlier crews, confinement had to be ruled out in the etiology of space flight-related changes. Apollo was a mission of physiological firsts: the first inflight illnesses were reported, and a series of cardiac arrhythmias occurred. The most important physiological changes were decreased cardiovascular responsiveness, reduced red blood cell mass, and musculoskeletal deterioration. Vestibular-related problems were also noted for the first time. Crewmen lost weight as a result of a hypocaloric regimen inflight and a tendency to lose body tissue under hypogravic conditions. Aldosterone production increased causing some intracellular fluid loss. Very few of the crewmen experienced any psychological problems after Apollo. (Author)

A74-42919 Effects of Co-60 on electrical self-stimulation of the brain and blood pressure in monkeys. A. Bruner (Lovelace Foundation for Medical Education and Research, Albuquerque, N. Mex.). *Aerospace Medicine,* vol. 45, Sept. 1974, p. 1058-1061. 13 refs. Contracts No. DASA01-70-C-0059; No. DNA001-74-C-0098.

The effects of 1000 and 2000 rads Co-60 on electrical self-stimulation of subcortical brain areas and blood pressure were investigated to determine whether radiation-induced performance decrement occurs in a like manner for a positively rewarded behavioral task as it does for the more typically studied shock-avoidance task. During the early postradiation minutes, self-stimulation responses decreased or ceased and resumed shortly thereafter, revealing a similar course of performance decrement as seen with shock-avoidance, discrimination tasks. Early postradiation hypotension with subsequent recovery paralleled the performance decrement, reproducing the blood pressure-behavior correlations seen previously with shock reinforcement. The blood pressure-elevating influence of the brain stimulation observed prior to irradiation was diminished or absent during the deep hypotensive stage postradiation, but tended to return minutes later. (Author)

A74-42920 Hemostatic alterations following severe dysbaric stress. M. J. Jacey, R. O. Madden, and D. V. Tappan (U.S. Naval Material Command, Naval Submarine Medical Research Laboratory, Groton, Conn.). *Aerospace Medicine,* vol. 45, Sept. 1974, p. 1062-1066. 24 refs.

Hemostatic parameters were measured in the blood of mature Sprague-Dawley rats during a three-day period following exposure to a compression-decompression schedule designed to produce severe dysbaric stress. The animals were compressed in air to 91.4 m (300 ft) of sea water for 30 min and stage decompressed over a 42-min interval. Acute decompression stress produced a transient decrease in clotting time. Circulating platelet population was unchanged during the early phase of recovery from severe decompression but had declined significantly by two days postsurfacing and then returned to control levels by the end of the observation period. Associated with the thrombocytopenic episode was a tendency toward platelet aggregation. Core temperature measurements indicated a persistent hyperthermic condition. (Author)

A74-42921 **Systems design for airport health management.** T. L. Kurt (Harvard University, Boston, Mass.). *(Aerospace Medical Association, Annual Meeting, 45th, Washington, D.C., May 6-9, 1974.) Aerospace Medicine*, vol. 45, Sept. 1974, p. 1067-1070. 28 refs.

Health care at many major airports can best be described as a nonsystem which is skimpy, absent, or chaotic. A cybernetic matrix is created to interrelate the emerging concept of airport health with functional needs and organizations. All resources are integrated into a managerial design to form a feedback-oriented structure to solve airport health problems. Comprehensive health planning would be generated through a constituent-based Airport Health Authority Board (AHAB). Traditional airport industrial and private medical practice would function separately and participate intensively as members of the AHAB in joint planning responsiveness. This management design assures provision of comprehensive health services where jurisdiction and responsibility have not been clear in the past. (Author)

A74-42923 **Medical experience in survival.** S. Olmedo (Chilean Air Force, Santiago de Chile, Chile). *Aerospace Medicine*, vol. 45, Sept. 1974, p. 1075-1077.

The results of an experiment in survival undertaken by a group of ensigns and officers of the Chilean Air Force School are presented. The experiment involved walking through the Atacama Desert in Northern Chile for three days, covering a distance of 90 km. Weight, urine samples, and hematocrits were taken before and after the experience. The psychological impact on these men is also recorded. The results obtained demonstrate the effects of the men's exposure to the sun's rays, the loss of weight and signs of hemoconcentration, and the changes in character and behavior. Emphasis is placed on the need for training ensigns in the techniques of survival, especially in the desert. (Author)

A74-42924 **Flying decompensation syndrome and fear of flying.** T. Llosa-Rojas. *Aerospace Medicine*, vol. 45, Sept. 1974, p. 1078-1080. 16 refs. Translation.

The natural history of man's acquisition of flying activities is presented. In this industrial society and age, man has become dependent upon his own inventions to the extent of giving over his own safety to them. In order to explain the reaction, fear of flying, the flying compensation syndrome and the flying decompensation syndrome are proposed. It may be concluded that fear of flying may be normal or abnormal but not, as a sole symptom, indicative of psychopathology. The differential diagnostic characteristics between the flying decompensation syndrome and phobic neurosis are enumerated, and a new nosologic scheme concerning fear of flying is thus developed. (Author)

A74-43044 **Class structure in the biasing of perceived pattern similarity.** L. S. Aiken (Temple University, Philadelphia, Pa.), R. M. Fenker, and S. H. Evans (Texas Christian University, Fort Worth, Tex.). *Journal of Experimental Psychology*, vol. 103, Sept. 1974, p. 489-501. 24 refs. Grant No. DHAD05-68-C-0176. Project THEMIS.

Current judgment models underlying multidimensional scaling assume that perceived interstimulus proximity is determined solely by intradimensional differences between stimuli, independent of context effects. Class structure represents a context effect, with class centroids constituting multidimensional anchors within a configuration. The dependence of proximity judgments on class structure was examined to test the appropriateness of the multidimensional scaling (MDS) judgment model for configurations containing element clusters. Stimuli were multidimensional patterns generated to form two classes. Feature usage in judgments of intraclass similarity differed markedly from that in interclass similarity judgments. Moreover, the perceived similarities of 90 between-class pairs were in part determined by the distances of the pair members from class centroids, as well as by intradimensional differences. The partial context dependence of subjective proximity estimates suggests a source of incompleteness of the current MDS judgment model as applied to class structured events. (Author)

A74-43045 **Visual detection and visual imagery.** M. J. Peterson and S. E. Graham (Indiana University, Bloomington, Ind.). *Journal of Experimental Psychology*, vol. 103, Sept. 1974, p. 509-514.

If visual perception and visual imagery involve similar mechanisms, then instructing Ss to imagine scenes compatible with a visual signal should facilitate detection of the signal, while instructing Ss to imagine scenes incompatible with the visual signal should hinder detection of the signal. Segal's assimilative theory of imagery predicts superior detection when the image and the external target signal differ; hence, this theory expects more accurate detection of the signal when the images are incompatible than when they are compatible with the signal. The Ss performed a visual detection task under three conditions: compatibly cued, incompatibly cued, and noncued. The imagery group was instructed to imagine the referents of the verbal cues, while the control group simply listened to the cues. The imagery group showed facilitation with compatible cuing and interference with incompatible cuing. The control group also showed facilitation under compatible cuing, but incompatible cuing had no effect. (Author)

A74-43127 # **Basic concepts in electronic modeling of heat balance in the man-environment system (Osnovy elektronnogo modelirovaniia teplovogo balansa v sisteme chelovek-sreda).** A. N. Shcherban', A. V. Primak, N. I. Furman, D. I. Pashko, V. N. Poliakov, and A. G. Marusov (Akademiia Nauk Ukrainskoi SSR, Institut Tekhnicheskoi Teplofiziki, Kiev, Ukrainian SSR). *Teplofizika i Teplotekhnika*, no. 26, 1974, p. 19-23. 6 refs. In Russian.

A mathematical model is proposed for the quantitative evaluation of heat transfer between a human being and the ambient atmosphere which takes into account various microclimatological factors. Basis of the model is an expression relating heat produced by the organism to heat transfer through clothing, heat transfer by radiation, heat transfer by perspiration, and a quantity indicating excess or insufficient warmth in the organism. Functional relations are then employed to sketch an electronic model for automatic control of the index of disbalance between heat produced by the organism and heat participating in heat transfer. P.T.H.

A74-43150 **Dimensions and volumes of left atrium and ventricle determined by single beam echocardiography.** F. J. ten Cate, F. E. Kloster, W. G. van Dorp, G. T. Meester, and J. Roelandt (Erasmus University, Rotterdam, Netherlands). *British Heart Journal*, vol. 36, Aug. 1974, p. 737-746. 28 refs.

A74-43219 **Bicircadian periodicity of the cycle of sleep and wakefulness under 'outside time' conditions - Polygraphic study (Périodicité bicircadienne du cycle veille-sommeil dans des conditions hors du temps - Etude polygraphique).** G. Chouvet, J. Mouret, J. Coindet, M. Jouvet (Hôpital Neurologique, Lyons, France), and M. Siffre (Hôpital Neurologique, Lyons; Institut Français de Spéléologie, Nice, France). *Electroencephalography and Clinical Neurophysiology*, vol. 37, Oct. 1974, p. 367-380. 19 refs. In French. Research supported by the Institut National de la Santé et de la Recherche Médicale; Délégation Générale à la Recherche Scientifique et Technique Contract No. 68-01-379; Direction des Recherches et Moyens d'Essais Contract No. 72/108; Centre National de la Recherche Scientifique Contract No. La-162.

Review of the polygraphic records (including 137 sleep records) obtained from three young male volunteer subjects while they were isolated 'outside time' in two noncommunicating cave shelters 65 and 85 m deep, respectively, for 5 to 6 months. With variable latencies, all the subjects reached a bicircadian rhythm (34 hrs of wakefulness followed by 14 hrs of sleep) which they felt to be a 24-hr rhythm. The internal organization of sleep is discussed in relation to the adaptability to a bicircadian rhythm. M.V.E.

A74-43220 * **Auditory and visual evoked potentials during hyperoxia.** D. B. D. Smith (Southern California, University, Los Angeles; NASA, Ames Research Center, Moffett Field, Calif.) and P. J. Strawbridge (NASA, Ames Research Center, Moffett Field, Calif.). *Electroencephalography and Clinical Neurophysiology*, vol. 37, Oct. 1974, p. 393-398. 25 refs.

Experimental study of the auditory and visual averaged evoked potentials (AEPs) recorded during hyperoxia, and investigation of the effect of hyperoxia on the so-called contingent negative variation (CNV). No effect of hyperoxia was found on the auditory AEP, the visual AEP, or the CNV. Comparisons with previous studies are discussed. M.V.E.

A74-43221 **EEG radio telemetry.** G. Manson (Glasgow, University, Glasgow, Scotland). *Electroencephalography and Clinical Neurophysiology*, vol. 37, Oct. 1974, p. 411-413.

Description of the required properties of a multichannel radio telemetry system for continuous EEG monitoring. The regulations of various countries applicable to such radio transmissions are tabulated, and a system that conforms to the stringent U.K. regulations, but is adaptable for use in other countries, is reviewed. M.V.E.

A74-43388 * **The polyuria of paroxysmal atrial tachycardia.** M. J. Kinney (U.S. Public Health Service Hospital, Staten Island, N.Y.), R. M. Stein (U.S. Veterans Administration Hospital, Bronx, N.Y.), and V. A. DiScala (Mount Sinai School of Medicine, New York, N.Y.). *Circulation*, vol. 50, Sept. 1974, p. 429-435. 22 refs. Grant No. PHS-P-70-41-66. NASA Order T-91344.

Two patients with paroxysmal atrial fibrillation and an associated polyuria were studied to delineate the mechanism of the increase in urine flow. A striking saluresis was noted in both patients. The increased sodium excretion was probably due to decreased sodium reabsorption, perhaps at proximal tubular nephron sites. This inhibition of sodium reabsorption could explain both the saluresis and some part or all of the polyuria. Re-evaluation of earlier case reports reveals patterns of concomitant salt and water excretion consistent with this mechanism. The saluresis cannot be explained by the previously favored hypothesis of antidiuretic hormone inhibition. (Author)

A74-43389 **Computer analysis of the orthogonal electrocardiogram and vectorcardiogram in mitral stenosis.** A. Walston, A. Harley, and H. V. Pipberger (U.S. Veterans Administration Hospital, Durham, N.C.; George Washington University, Washington, D.C.). *Circulation*, vol. 50, Sept. 1974, p. 472-478. 19 refs. Grant No. NIH-HL-15047.

A74-43390 **Retrograde invasion of the bundle branches producing aberration of the QRS complex during supraventricular tachycardia studied by programmed electrical stimulation.** R. A. J. Spurrell (St. Bartholomews Hospital, London, England), D. M. Krikler, and E. Sowton (Guy's Hospital, London, England). *Circulation*, vol. 50, Sept. 1974, p. 487-495. 14 refs. Research supported by the British Heart Foundation and Devices Instruments, Ltd.

A74-43391 **Average coronary blood flow per unit weight of left ventricle in patients with and without coronary artery disease.** F. J. Klocke (E. J. Meyer Memorial Hospital, Buffalo, N.Y.), I. L. Bunnell, D. G. Greene, S. M. Wittenberg, and J. P. Visco (New York, State University; Buffalo General Hospital; E. J. Meyer Memorial Hospital, Buffalo, N.Y.). *Circulation*, vol. 50, Sept. 1974, p. 547-559. 34 refs. Grants No. NIH-HL-09587; No. NIH-HL-15194; No. NIH-PH-43-69-28.

A74-43392 **Echocardiographic evaluation of pulmonary hypertension.** N. C. Nanda, R. Gramiak, T. I. Robinson, and P. M. Shah (Rochester, University, Rochester, N.Y.). *Circulation*, vol. 50, Sept. 1974, p. 575-581. 21 refs. Grants No. NIH-1-R01-HL-15186-01; No. NIH-HL-03966; No. NIH-HL-05500.

Echocardiographic recordings of the pulmonary valve of 63 adults were analyzed in order to assess the use of ultrasound in the recognition of pulmonary hypertension and to better define the criteria by which the severity of this condition can be estimated in echocardiographic examinations. Parameters which could be measured and which revealed differences between patients with normal pulmonary artery pressure and those suffering from pulmonary hypertension were the position of valve images in diastole, opening speed of valves, displacement of the cusp echoes with atrial systole, and length of pre-ejection periods. Results show that ultrasound is a useful tool in the diagnosis and evaluation of pulmonary hypertension. P.T.H.

A74-43393 **Passive elasticity of the human left ventricle.** A. Fester (Mount Sinai Medical Center, Miami Beach, Fla.) and P. Samet (Miami, University, Coral Gables, Fla.). *Circulation*, vol. 50, Sept. 1974, p. 609-618. 27 refs.

A total of 45 patients undergoing routine diagnostic cardiac catheterization for valvular and/or potential coronary artery disease served as study subjects. Based on data obtained from them, pressure-volume relationships of the intact left ventricle during diastole and descriptions of diastolic behavior in terms of stress/strain relationships using a spherical and ellipsoid geometry were evaluated. Lagrangian as well as the natural strain definitions for the intact human heart were used. Natural elastic stiffness for a spherical model and stiffness constant were evaluated using precise pressure/volume relationships. Stiffness constants were found to correlate well with one another and to be sensitive to the magnitude of damage to individual myocardium caused by the particular disease state of the subject's heart. It was concluded that the biophysical disorder of a given disease and its distribution in the left ventricular wall are chiefly responsible for the calculated determinants of stiffness. P.T.H.

A74-43401 # **Echocardiogram of the pulmonary valve.** T. Sakamoto, M. Matsuhisa, T. Hayashi, and H. Ichiyasu (Tokyo, University, Bunkyo, Japan). *Japanese Heart Journal*, vol. 15, July 1974, p. 360-373. 9 refs.

Review of echocardiograms of the pulmonary valve recorded in 11 normal subjects and in 70 patients with various diseases. Pulmonary valve echoes were generally weak, and the left cusp was detected as a distinct echo. Echo strength and pattern variations and their diagnostic implications are discussed. M.V.E.

A74-43448 # **Seasonal difference in responses of body fluids to heat stress.** T. Morimoto, M. Asayama (Kyoto Prefectural University of Medicine, Kamigyoku, Japan), and K. Shiraki (Tokushima University, Kuramotocho, Japan). *Japanese Journal of Physiology*, vol. 24, June 1974, p. 249-262. 26 refs. Research supported by the Ministry of Education.

Investigation of the mechanism of body fluid regulation under heat stress by means of simultaneous measurements of blood constituents and of the size of body fluid compartments. Winter and summer responses of body fluids to sweat loss are also compared. M.V.E.

A74-43449 # **Indices and sweating patterns for the assessment of heat tolerance.** S. Hori (Hyogo Medical College, Nishinomiya, Japan), A. Inouye, and H. Ihzuka (Kyoto University, Kyoto, Japan). *Japanese Journal of Physiology*, vol. 24, June 1974, p. 263-275. 16 refs. Research supported by the Ministry of Education and Fujiwara Memorial Foundation.

A74-43450 # **Separation of the contributions of voluntary and vibratory activation of motor units in man by cross-correlograms.** K. Hirayama, S. Homma, M. Mizote, Y. Nakajima (Chiba University, Chiba, Japan), and S. Watanabe (Kyohrin University, Mitaka, Tokyo, Japan). *Japanese Journal of Physiology*, vol. 24, June 1974, p. 293-304. 22 refs. Research supported by the Mitsubishi Foundation.

Using cross-correlograms, the relationship between vibration and

human motor unit spikes elicited by reflex and voluntary actions is investigated. The use of this procedure is shown to make it possible to examine whether an augmentation of motor unit spikes during 'tonic vibration reflex' has been recruited by 'locked' or 'unlocked' spikes. The results of a corresponding experiment with 20 male adults are described and discussed. M.V.E.

A74-43527 # **Secondary visual aftereffect in the human eye (Efekt vtorinnogo pisliabachennia liuds'kogo oka).** O. M. Svenson, V. V. Rudenko, N. T. Tinna, and T. M. Lunik. *Akademiia Nauk Ukrains'koi RSR, Visnik,* vol. 38, July 1974, p. 20, 21. In Ukrainian.

Perception of positive distinct black and white images lasting 4 to 12 sec is detected in subjects 3 to 5 sec after the observation of objects on a screen in a dark room when their vision was fixed on the objects by a mechanical device and a flash lamp provided intermittent illumination. A diagram of the test stand is given and the testing procedure is described. V.Z.

A74-43648 # **Approximate formulas for evaluating the active metabolism of sportsmen (Nablizheni formuli dlia otsinki aktivnogo obminu u sportsmeniv).** L. P. Kozlov (Akademiia Nauk Ukrains'koi RSR, Institut Gidromekhaniki, Kiev, Ukrainian SSR). *Akademiia Nauk Ukrains'koi RSR, Dopovidi, Seriia B - Geologiia, Geofizika, Khimiia i Biologiia,* vol. 36, July 1974, p. 648-650. 18 refs. In Ukrainian.

Prosser and Braun (1967) showed that the basal energy metabolism of warm-blooded animals increases proportionally to the three-fourth power of the body weight. It is shown that the active energy metabolism is governed by the same law, and that it is a function of the duration of the effort. Approximate expressions for calculating the active metabolism for efforts lasting from 0.3 to 100 sec and from 100 to 100,000 sec are proposed. V.P.

A74-43783 **Test of color-defective vision using the visual evoked response.** J. A. S. Kinney and C. L. McKay (U.S. Navy, Naval Submarine Medical Research Laboratory, Groton, Conn.). *Optical Society of America, Journal,* vol. 64, Sept. 1974, p. 1244-1250. 23 refs.

This paper describes a new technique for detecting color-defective individuals, based upon the isolation of a pattern response from the visual evoked response. Specifically designed targets were produced from equal-luminance hues that lie on the confusion lines of deuteranopes, protanopes, and tritanopes. Sixteen color normals, eight deuteranopes, eight protanopes, and one tritanope were tested with these targets. The results showed that color normals give a pattern response to patterns formed of hue differences only; this response is similar to that produced by luminance differences. Color-defective individuals, on the other hand, give no pattern response to targets formed of hues that they cannot discriminate, although they give pattern responses for luminance differences. (Author)

A74-43784 **Perceived spatial frequency varies with stimulus duration.** P. Tynan and R. Sekuler (Northwestern University, Evanston, Ill.). *Optical Society of America, Journal,* vol. 64, Sept. 1974, p. 1251-1255. 15 refs. Grant No. NIH-EY-00321.

A TV technique was used to determine the exposure-time dependent variations in the appearance of suprathreshold sinusoidal gratings as perceived by subjects in four experiments in a study of perceived spatial frequencies in humans. It is found that a sinusoidal grating was perceived at higher spatial frequencies after brief stimulation than after longer exposures of the eye to stimulation. The effect was observed only in low spatial frequency gratings. V.Z.

A74-43785 **Electroretinogram and visually evoked potential associated with paced saccadic displacement of the stimulus.** L. E. Flamm (Texas A & M University, College Station, Tex.). *Optical Society of America, Journal,* vol. 64, Sept. 1974, p. 1256-1262. 20 refs.

A74-43786 **Relations between the amplitudes of spontaneous saccades and visual responses.** J. C. Armington and M. B. Bloom (Northeastern University, Boston, Mass.). *Optical Society of America, Journal,* vol. 64, Sept. 1974, p. 1263-1271. 41 refs. Grants No. NIH-EY-0759; No. PHS-RR-07143.

Electroretinograms and visually evoked cortical potentials, dependent on the occurrence of spontaneous saccadic eye movements, were recorded from human observers. A computer system was used to isolate average-response waveforms that result from saccadic displacements of the retinal image. The responses were recorded as the observer fixed his eye on the center of a steady pattern of vertical stripes presented in Maxwellian view. The responses depended on the spatial frequency of the pattern being viewed; in all cases, they were proportional to the extent of saccadic movement. The results are interpreted in terms of response additivity and the numbers of cones stimulated by the image displacement. (Author)

A74-43905 **Microwave power density measurements in the presence of biological specimens of size comparable to the free space wavelength of the imposed radiation.** J. Bigu del Blanco (Queen's University, Kingston, Ontario; National Research Council, Control Systems Laboratory, Ottawa, Canada), C. Romero-Sierra (Queen's University, Kingston, Ontario, Canada), and J. A. Tanner (National Research Council, Control Systems Laboratory, Ottawa, Canada). In: Electromagnetic Compatibility Symposium, 16th, San Francisco, Calif., July 16-18, 1974, Record. New York, Institute of Electrical and Electronics Engineers, Inc., 1974. 7 p. 17 refs.

A74-43950 **Clothing design for comfort and work performance in extreme thermal environments.** R. F. Goldman (U.S. Army, Research Institute of Environmental Medicine, Natick, Mass.). *New York Academy of Sciences, Transactions, Series 2,* vol. 36, June 1974, p. 531-544. 8 refs.

It is pointed out that an assessment of the insulation value and evaporative impedance value of a clothing system is useful in the selection of a preferable type of clothing for manned space missions in terms of thermal protection and physical comfort. Suggestions are given for suitable clothing designs, with particular attention to the effects of cut, drape and fit. V.Z.

A74-44023 # **Energy consumption estimate for a walking man (Otsenka energeticheskikh zatrat cheloveka pri khod'be).** I. Sh. Moreinis, N. A. Kuril'skaia, G. P. Gritsenko, Ia. L. Slavutskii, and N. V. Baskakova. *Mekhanika Mashin,* no. 43, 1974, p. 38-43. In Russian.

The problem of simulating man's striding motion is studied with the aid of methods of classical mechanics, biomechanics, and electrophysiology, using a four-link physical pendulum whose point of suspension coincides with the center of the hip joint as the model imitating the motions of the lower extremities. The results of the solution are seen to be useful in the development of a striding robot. V.P.

A74-44058 **Eye movements and occipital electrocortical rhythms - Effects of stimulation of the frontal eye field in the cat.** J. Schlag, O. Petre-Quadens, C. De Lee, and B. Goffe (California, University, Los Angeles, Calif.; Fondation Born-Bunge pour la Recherche, Berchem, Belgium). *Journal de Physiologie,* vol. 68, Sept. 1974, p. 343-350. 23 refs. Research supported by the Fonds National de la Recherche Scientifique Grant No. NFWO-20323; Grants No. PHS-NS-21633; No. NS-04955.

Recruiting responses in the marginal gyrus of 15 cats with severed spinal cords were produced by low-frequency stimulation of their frontal eye fields. Similar responses by the same technique were obtained in an intact alert cat in a two month experiment. The existence in the occipital visual areas of a mechanism controlling the frontal eye field is deduced from the experiments. V.Z.

A74-44089 * **Fluoroscopic tomography.** N. A. Baily, R. L. Crepeau, and E. C. Lasser (California, University, La Jolla, Calif.). *Investigative Radiology*, vol. 9, Mar.-Apr. 1974, p. 94-103. 7 refs. Grants No. NGL-05-009-103; No. NIH-HL-13932-03.

A fluoroscopic tomography system capable of synthesizing body sections at a number of levels within the body has been developed. The synthesized body sections may lie either in a range of planes parallel to, tilted with respect to, skewed with respect to, or both tilted and skewed with respect to the plane of motion of the X-ray tube target. In addition, body sections can be presented which are contoured to the patient's anatomy. That is to say, they may even encompass such complex surfaces as a quadratic hyperplane. In addition, tomograms of organs in motion can be imaged. (Author)

A74-44125 **Rod origin of prolonged afterimages.** D. I. A. MacLeod and M. Hayhoe (Florida State University, Tallahassee, Fla.). *Science*, vol. 185, Sept. 27, 1974, p. 1171, 1172. 9 refs. NSF Grant No. GU-2612; Grant No. NIH-EY-00684.

Afterimages fade against any unchanging background but generally reappear if the background changes suddenly. Under some conditions, however, a change of background color fails to revive a faded afterimage. This happens only if the interchanged backgrounds equally stimulate the rod receptors. It follows that afterimages seen under these conditions are generated by rods. (Author)

A74-44157 **Studies of auditory-visual differences in human time judgment. I - Sounds are judged longer than lights.** S. Goldstone and W. T. Lhamon (New York Hospital, White Plains, N.Y.). *Perceptual and Motor Skills*, vol. 39, Aug. 1974, pt. 1, p. 63-82. 12 refs.

Six experiments with human subjects are described which confirm the previously reported auditory-visual difference in time judgment (short sounds being judged as longer in duration than physically equivalent lights). The present experiments uncovered two stimulus factors (one for audition and one for hearing) which influenced the judged duration and which may have contributed to the auditory-visual difference. It is shown that moving line patterns were judged longer than solid light patches (with movement as the primary factor in changing apparent duration for visual stimuli) and that lowered sound intensity decreased, and higher intensity increased the magnitude of judged auditory duration. T.M.

A74-44158 **Ocular dominance reduced with practice.** L. C. Lack (South Australia, Flinders University, Bedford Park, Australia). *Perceptual and Motor Skills*, vol. 39, Aug. 1974, pt. 1, p. 203-206. 6 refs.

Changes of ocular dominance were measured with binocular rivalry tests in two groups of subjects after nine 4-min practice sessions. During practice sessions, one group passively viewed binocular rivalry while the second group attempted to reduce the magnitude of dominance by actively viewing rivalry. Passive viewing was ineffective, but the active viewing group showed a significant reduction of ocular dominance when dominance was measured with the rivalry stimuli used in the practice session. T.M.

A74-44159 **Emergent properties of visual patterns at sizes well above threshold.** J. B. Thurmond (Louisville, University, Louisville, Ky.), G. W. Menzer (Thomas More College, Covington, Ky.), and T. J. Rebbin (Bell Telephone Laboratories, Inc., Murray Hill, N.J.). *Perceptual and Motor Skills*, vol. 39, Aug. 1974, pt. 1, p. 231-238. 10 refs. Grant No. DAHC19-69-C-0009.

Performance in discriminating 4-, 6-, and 8-element histoforms and polygons was determined as a function of the visual angle they subtended. It was found that only above an angular size of 8 minutes were there differences in processing time and accuracy. This was interpreted as indicating that identification performance depends on emergent properties' of the forms, that is, the perception of the forms as a whole. P.T.H.

A74-44160 **Studies of auditory-visual differences in human time judgment. II - More transmitted information with sounds than lights.** W. T. Lhamon and S. Goldstone (New York Hospital, White Plains, N.Y.). *Perceptual and Motor Skills*, vol. 39, Aug. 1974, pt. 1, p. 295-307. 9 refs.

Eleven experiments are reported which confirmed the presence of a striking auditory-visual difference in the judgments of short durations. There was more information transmitted with auditory durations than with visual durations using the methods of pair-comparison and absolute judgment. Variations of several stimulus properties and aspects of the psychophysical context did not alter this intersensory difference. (Author)

A74-44199 **Flexibility or optimality in design.** R. A. Edenborough (RAF, Institute of Aviation Medicine, Farnborough, Hants., England). *The Controller*, vol. 13, Aug. 1974, p. 42-45.

Human factors involved in air traffic control systems are discussed in terms of the choice between design flexibility or design optimality as the preferred criterion of design quality. The scope, advantages and problems of flexibility are evaluated against the problems of optimality in an attempt to find a solution. It is believed that the issue of flexibility or optimality is not one of confrontation but adjustment of two different approaches to the same problem. V.Z.

A74-44300 **Analysis of periodic components of hypothalamic spike-trains after central thermal stimulation.** R. Jahns and J. Werner (Ruhr-Universität, Bochum, West Germany). *Pflügers Archiv*, vol. 351, no. 1, 1974, p. 13-24. 15 refs.

Spike sequencies from preoptical areas of the hypothalamus of anesthetized rats were tape-recorded at normal temperature and after warming and cooling. Some twelve heat-sensitive and seven cold-sensitive neurons were identified among the 52 neurons studied, by a correlative analysis of a total of 177 spike sequencies from these neurons. Most of the correlograms of the heat-sensitive neurons were periodic while those of thermally-insensitive neurons were predominantly nonperiodic as were also those of the cold-sensitive neurons. V.Z.

STAR ENTRIES

N74-31545*# Techtran Corp., Glen Burnie, Md.
THE RECIPROCAL EXCLUSION OF AMYLOIDOSIS-DISSEMINATED LUPUS ERYTHEMATOSUS
M. F. Kahn, J. Rousseau, C. Vitale, and M. DeSeze Washington NASA Aug. 1974 5 p refs Transl. into ENGLISH from La Nouvelle Presse Medicale (France), v. 3, no. 6, 1974 p 1033
(Contract NASw-2485)
(NASA-TT-F-15880) Avail: NTIS HC $4.00 CSCL 06E

It is observed that presence of LED mutually excludes amyloidosis and vice versa. The only known possible exceptions are cases of rheumatoid polyarthritis with amyloidosis and LE cells, but without cutaneous or visceral manifestations of LED. The consensus of opinion is that these cases belong mainly to the clinical sphere of PR (hence are susceptible to amyloidosis) and not LED. Author

N74-31546*# Pennsylvania Univ., Philadelphia. Dept. of Biology.
EFFECTS OF PROLONGED ACCELERATION WITH OR WITHOUT CLINOSTAT ROTATION ON SEEDLINGS OF ARABIDOPSIS THALIANA (L.) HEYNH
Allan H. Brown, A. O. Dahl, and Lars Loercher 31 Jul. 1974 41 p
(Grants NGR-39-030-010; NGR-39-010-149)
(NASA-CR-139584) Avail: NTIS HC $5.25 CSCL 06C

Three 21-day tests of the effects of chronic centrifugation were carried out on populations of Arabidopsis thaliana. In addition to 1 g the resultant g-forces tested were: 2,4,6,8,16, and 20 g. Observed end points included gross morphological characters such as size of plant organs and, at the other extreme, features of sub-cellular structure and ultrastructure. Plants were grown on banks of clinostats. The acceleration vector was directed either parallel with the plants' axes or transverse to the axes. Plant responses to chronic axial acceleration and to transverse acceleration with clinostated plants were determined. From the data obtained it was possible in some cases: (1) to determine the g-functions of specific plant developmental characters; (2) to extrapolate those functions to the hypothetical value at zero g in order to predict (tentatively) the morphology of a plant grown in space, (3) to describe morphological effects of clinostat rotation, (4) to determine which of those effects was influenced by the prevailing g-force, and (5) to put to direct test the assumption that clinostat rotation nullifies or compensates for the influence of gravity. Author

N74-31547*# Linguistic Systems, Inc., Cambridge, Mass.
NATURE OF THE CHANGES IN THE TENDINOUS REFLEXES IN ATHLETES
A. A. Krobova Washington NASA Aug. 1974 8 p Transl. into ENGLISH from Teor. Prakt. Fiz. Kultury (USSR), v. 22, no. 4, 1959 p 290-292
(Contract NASw-2482)
(NASA-TT-F-15735) Avail: NTIS HC $4.00 CSCL 06P

An evaluation was made of the functional status of the central nervous system, including the reception of the motor apparatus, in athletes. Studies were made of the changes in the tendinous reflexes as a function of the nature, duration, and intensity of muscular activity. Results show that: (1) tendinous reflexes actually reflect the state of excitability of the central nervous system, and (2) under the influence of muscular activity, the intensity of tendinous reflexes increases during brief muscular stress; prolonged activity, violent exercise, and working to exhaustion cause a decrease in reflex responses. Author

N74-31548*# Scientific Translation Service, Santa Barbara, Calif.
PRINCIPAL FORMS OF INTRACRANIAL HYPOTENSION, SECOND REPORT
P. Puech, P. Guilly, J. Morice, and M. Brun Washington NASA Aug. 1974 37 p Transl. into ENGLISH from Rev. Neurol. (France), v. 80, 1948 p 458-473
(Contract NASw-2483)
(NASA-TT-F-15850) Avail: NTIS HC $5.00 CSCL 16P

After a short historical survey and a discussion of some anatomical-surgical considerations, the clinical aspects of intercranial hypotension are evaluated in detail. The synthesis of physiopathological concepts now known makes it possible to carry out an interpretation test of the syndrome. Author

N74-31549*# Linguistic Systems, Inc., Cambridge, Mass.
CHANGE IN VASCULAR TONE UNDER THE INFLUENCE OF HYPODYNAMIA
V. Ye. Vasilyeva, O. N. Belina, and T. D. Vasilyeva Washington NASA Aug. 1974 5 p Transl. into ENGLISH from Probl. Kosmich. Meditsiny (Moscow), 1966 p 92-93
(Contract NASw-2482)
(NASA-TT-F-15734) Avail: NTIS HC $4.00 CSCL 06P

Before and after 10 days of hypodynamia, cardiograms from which the rate of propagation of pulse value (pwpr) was calculated were taken from test subjects, young well-trained athletes. Pwpr along elastic type vessels does not significantly change as a result of hypodynamia; pwpr along muscular type vessels drops sharply as a result of hypodynamia. A drop in the tone of muscle elements is concluded to be a logical consequence of prolonged hypodynamia. Author

N74-31550# Advisory Group for Aerospace Research and Development, Paris (France).
THE OPERATIONAL CONSEQUENCES OF SLEEP DEPRIVATION AND SLEEP DEFICIT
Averne C. Johnson (Navy Med. Neuropsychiatric Res. Unit) and Paul Naitoh (Navy Med. Neuropsychiatric Res. Unit) Jun. 1974 50 p refs
(AGARD-AG-193; AGARDograph-193) Avail: NTIS HC $5.50

The effects of total sleep loss, partial sleep loss, and sleep stage deprivation are reviewed, with particular attention to performance decrement and operational consequences. No consistent or uniform performance decrement was found in operation studies within the 36 to 48 hour range of total sleep loss most likely to be experienced by aircrew personnel, even though laboratory studies identified decrement on certain types of tasks. Physiological changes are minimal during moderate sleep loss, but mood changes are clearly noticeable. The most likely sleep problems for aircrew members are those associated with disruption of sleep-wakefulness cycles and partial sleep loss. Consistent performance decrement is difficult to find, but marked increase in fatigue is a common influence on performance, and it interacts with other stressors to enhance the stress-induced physiological responses. Deprivation of sleep stage rapid eye movement (REM) or sleep stage four produces no behavioral changes supportive of earlier beliefs that these two stages, especially stage REM, are necessary for effective waking behavior. Author

N74-31551# Scientific Translation Service, Santa Barbara, Calif.
EFFECTS OF SINGLE COMPONENTS IN AUTOMOBILE EXHAUSTS ON HUMANS AND ANIMALS
H. M. Wagner 1974 16 p Transl. into ENGLISH of the Schriftenreihedes Vereins fuer Wasser, Boden, und Lufthygiene (Berlin-Dahlem), no. 38, 1972 p 313-325 Sponsored by EPA
(TR-101-74) Avail: NTIS HC $4.00

The dangers of automobile exhaust to animals and humans are investigated. Attempts were made to: (1) sample by-products of caused by exhaust reactions in the atmosphere; (2) distinguish between acute and chronic toxicity of individual exhaust components; (3) determine the combined effect of various exhaust

components; and (4) develope ways to determine effects of exhaust components in low concentrations. The environmental impact of these exhausts was discussed. E.H.W.

N74-31552*# Naval Biomedical Research Lab., Oakland, Calif.
EVIDENCE FOR METABOLIC ACTIVITY OF AIRBORNE BACTERIA Quarterly Report, 1973 - 1974
R. L. Dimmick, H. Wolochow, M. A. Chatigny, P. A. Straat, J. R. Schrot, and G. V. Levin 1974 9 p refs
(NASA Order W-13450)
(NASA-CR-139620; QR-2) Avail: NTIS HC $4.00 CSCL 06M

Aerosols of the bacterium Serratia marcescens, and of uniformly labelled C-14 glucose, were created simultaneously and mixed in tubing leading to an aerosol chamber. During a subsequent period of about 5 hrs, C-14O2 was produced unequivocally within the chamber, and insoluble, labelled material within the suspended particles first increased, then decreased. Author

N74-31553*# Naval Biomedical Research Lab., Oakland, Calif.
RELEASE OF BACTERIAL SPORES FROM INNER WALLS OF A STAINLESS STEEL CUP SUBJECTED TO THERMAL STRESS Quarterly Report, 1973 - 1974
H. Wolochow, M. A. Chatigny, and J. Herbert 1974 19 p refs
(NASA Order W-13450)
(NASA-CR-139621; QR-1) Avail: NTIS HC $4.00 CSCL 06M

In an earlier report thermal stresses, simulating those expected on a Mars Lander, dislodged approximately 0.01% of an aerosol deposited surface burden, as did a landing shock of 8-10 G deceleration. This work confirms earlier results and demonstrates that release rate is not dependent on surface burden. Author

N74-31554*# Scientific Translation Service, Santa Barbara, Calif.
THE SIGNIFICANCE OF PROLONGED CLINOSTATIC HYPODYNAMIA IN THE CLINICAL PICTURE OF NERVOUS DISEASES
T. N. Krupina and A. Ya. Tizul Washington NASA Aug. 1974 12 p refs Transl. into ENGLISH from Zh. Nevropatol. Psikhiat. (USSR), no. 7, 1968 p 1008-1014
(Contract NASw-2483)
(NASA-TT-F-15895) Avail: NTIS HC $4.00 CSCL 06E

The authors studied the character of changes of the neurovegetative functions during a 62-day clinostatical hypokynesis, and their relation to motor activity. The experiments were conducted with 6 normal males in the age of 23-36. At the end of the experiment there was a definite hypotrophy of the lower extremity muscles. All these symptoms had a tendency to develop with an increase of time and were much more expressed in examinees not receiving physical exercises. Author

N74-31555*# Scientific Translation Service, Santa Barbara, Calif.
IMMUNOLOGICAL DIAGNOSTICS AND DIFFERENTIAL DIAGNOSIS OF LUPUS ERYTHEMATOSUS
Wolfgang P. Herrmann Washington NASA Aug. 1974 14 p refs Transl. into ENGLISH from Z. Dermatol., Venerol. und Verwandte Gebiete (West Germany), v. 25, no. 5, May 1974 p 209-211
(Contract NASw-2483)
(NASA-TT-F-15896) Avail: NTIS HC $4.00 CSCL 06E

Methods in current use for determination and differential diagnosis of systemic lupus erythematodes are summarized and discussed. Author

N74-31556*# Kanner (Leo) Associates, Redwood City, Calif.
ECOLOGY OF SOIL MICROORGANISMS: RELATIONSHIP BETWEEN THE NUMBER OF MICROORGANISMS IN THE SOIL AND THEIR CHEMICAL ACTIVITY
M. Nishio Washington NASA Sep. 1974 25 p refs Transl. into ENGLISH from Hakko Kyokai-shi (Japan), v. 31, no. 1, 1973 p 9-15
(Contract NASw-2481)
(NASA-TT-F-15902) Avail: NTIS HC $4.25 CSCL 06M

It is extremely difficult to determine the types and numbers of microorganisms which are actually engaged in a given metabolic activity in the soil. Currently used measuring methods, such as the dilution plate method or counting methods using microscopes, are inadequate, and more study must be devoted to other somewhat more promising methods such as staining, ATP determination, use of fluorescent antibodies, and especially autoradiography. Author

N74-31557*# Scientific Translation Service, Santa Barbara, Calif.
THERMOPHILIC AND MESOPHILIC AMINOPEPTIDASES FROM BACILLUS STEAROTHERMOPHILUS
H. Zuber and G. Roncari Washington NASA Aug. 1974 8 p refs Transl. into ENGLISH from Angew. Chem. (West Germany), v. 79, no. 20, 1967 p 906-907
(Contract NASw-2483)
(NASA-TT-F-15901) Avail: NTIS HC $4.00 CSCL 06M

Various strains of B. stearothermophilus contain different proportions of three aminopeptidases. Obligately thermophilic strains contain more of the thermophilic enzyme; obligately mesophilic strains contain very little of it, and facultative strains contain similar amounts of the three. Author

N74-31558*# Kanner (Leo) Associates, Redwood City, Calif.
IMMUNOFLUORESCENCE IN THE FIELD OF LUPUS ERYTHEMATOSUS
J. Thivolet Washington NASA Aug. 1974 11 p Transl. into ENGLISH from G. Ital. Dermatol. (Italy), v. 109, no. 3, 1974 p 187-190
(Contract NASw-2481)
(NASA-TT-F-15876) Avail: NTIS HC $4.00 CSCL 06E

The search for antinucleus antibodies by means of immunofluorescence is important in the course of acute disseminated lupus erythematosus both diagnostically, because the antinucleus antibody and other autoantibodies allow its serologic analysis, and also pathogenetically, because the multiplicity of autoantibodies shows a deep disturbance of immunoregulation. In addition, the localization of depositis of immunoglobulin in target organs (skin and kidney) seems to be related to the deposition of immune complexes containing antinucleus antibodies. These expressions of the disease have a direct pathogenic role in its determination. Acute disseminated lupus erythematosus and chronic Lupus appear thus to be not only diseases with autoimmunization, but also deriving from autoimmunization. Author

N74-31559*# Kanner (Leo) Associates, Redwood City, Calif.
GEOCHEMICAL ACTIVITY OF MICROORGANISMS IN MINERAL DEPOSITS
S. I. Kuznetsov Washington NASA Sep. 1974 26 p refs Transl. into ENGLISH from Izv. Akad. Nauk SSSR, Ser. Biol. (USSR), v. 3, 1972 p 301-313
(Contract NASw-2481)
(NASA-TT-F-15916) Avail: NTIS HC $4.50 CSCL 06M

The activity of microorganisms was investigated in deposits of oil, ozokerite, sulfur, sulfide ores, and nonferrous metals and in lakes where deposition of lake iron-manganese ore takes place. Data are presented on distribution and activity of individual groups of microorganisms. Diagrams illustrating participation of the microorganism in formation or destruction of mineral deposits were drawn on the basis of these experiments. Author

N74-31560*# Kanner (Leo) Associates, Redwood City, Calif.
PHARMACOLOGICAL AND PHYSIOLOGICAL STUDIES ON PERSPIRATION CENTERS. 3: EFFECT OF THE MEDULA OBLONGATA ON SWEAT EXCRETION AND BODY TEMPERATURE
B. Hasama Washington NASA Sep. 1974 42 p refs Transl. into ENGLISH from Arch. Exp. Pathol. Pharm. (West Germany), v. 153, 1930 p 257-290
(Contract NASw-2481)
(NASA-TT-F-15898) Avail: NTIS HC $5.25 CSCL 06P

Injecting acidic Ringer's solution into the carotid or flushing the fourth ventricle with it causes sweat excretion and a temperature rise; alkaline solution inhibits sweat excretion and

temperature rise. Elimination of the diencephalon does not change these results. Chemical and electrical stimulation are studied in order to determine the areas of the medulla oblongata which are involved, and ergotoxine and atropine are used to block the sympathetic and parasympathetic systems. The dorsal vagal nucleus is concluded to be a subordinate perspiration and thermoregulatory center made up of a sympathetic part and a parasympathetic part which react differently to chemical, thermal and electrical stimuli, independently of diencephalic centers.
Author

N74-31561*# Techtran Corp., Glen Burnie, Md.
OCCURENCE OF VIRUS-LIKE PARTICLE IN LYMPH NODES WITH LUPUS ERYTHEMATODES
U.-F. Haustein Washington NASA Sep. 1974 9 p refs Transl. into ENGLISH from Deut. Gesundheitsw. (West Germany), v. 27, no. 17, 1974 p 796-798
(Contract NASw-2485)
(NASA-TT-F-15845) Avail: NTIS HC $4.00 CSCL 06E

In lymph nodes of patients, each suffering from lupus erythematodes visceralis, lupus erythematodes chronicus disseminatus and lupus erythematodes chronicus discoides, virus-like particles (tubular-reticular structures) were detected which are localized in the endoplasmatic reticulum of the capillary endothelial cells, reticulum cells and lymphocytes. Their nature, whether they are a reaction product of the cell or nucleocapsides of (para)-myxoviruses, has not yet been determined. Author

N74-31562*# Kanner (Leo) Associates, Redwood City, Calif.
OPHTHALMOLOGICAL PROBLEMS IN SPACE FLIGHTS
G. B. Bietti Washington NASA Aug. 1974 15 p Transl. into ENGLISH from Boll. d'Oculist. (Italy), v. 49, no. 2, 1970 p 91-101
(Contract NASw-2481)
(NASA-TT-F-15875) Avail: NTIS HC $4.00 CSCL 06P

Ophthalmological problems have a prominent place in all aspects of flight. Some of the major ophthalmological problems met in the field of aviation and space medicine, such as: hypoxia, barometric depression, the effects of acceleration and supersonic speeds, vibrations, air drafts and external temperature are reviewed. A considerable amount of space is devoted to various problems dealing with illumination (dazzling, night flights, various types of *irradiations, color distinction, etc.).* Author

N74-31563*# Scientific Translation Service, Santa Barbara, Calif.
PHARMACOLOGICAL AND PHYSIOLOGICAL STUDIES OF THE SWEAT CENTERS. 2: ON THE EFFECT OF DIRECT MECHANICAL, THERMAL, AND ELECTRICAL STIMULATION ON THE SWEAT AND HEAT CENTERS
Bun-ichi Hasama Washington NASA Sep. 1974 46 p refs Transl. into ENGLISH from Arch. Pharmakol. Exp. Pathol. (West Germany), v. 146, 1929 p 129-161
(Contract NASw-2483)
(NASA-TT-F-15899) Avail: NTIS HC $5.50 CSCL 06P

A thermogenetic area was found in the subthalamic region of the cat, with both mechanical and electrical stimuli. The same zones gave a temperature rise with cold stimulus and temperature lowering with heat stimulus. Other relations were shown between heat and sweat centers. The sweat-producing impulses produced by heat are apparently carried by parasympathetic nerves, and those produced by cold are carried by sympathetic nerves.
Author

N74-31564*# Kanner (Leo) Associates, Redwood City, Calif.
PROBLEMS OF PARAMYXOVIRUS IN AUTOIMMUNE DISEASE
R. Caputo Washington NASA Aug. 1974 6 p Transl. into ENGLISH from G. Ital. di Dermatol. (Italy), v. 109, no. 3, 1974 p 195-196
(Contract NASw-2481)
(NASA-TT-F-15878) Avail: NTIS HC $4.00 CSCL 06E

There are two different interpretations of the nature of the structures similar to paramyxovirus found in the tissues of patients suffering from autoimmune diseases: either they are aggregates of viral particles, or they are tubular formations deriving from the E. R. Although it seems to have been proven that these are not viral particles, the structures have been found very frequently in certain autoimmune diseases, thus leading some authors to believe that they reflect the presence or the ability to produce immunoglobulins. Author

N74-31565*# Kanner (Leo) Associates, Redwood City, Calif.
APPROXIMATIVE CALCULATION OF THE BUFFER BASE, *THE TITRATION CURVE, AND CO2-DISSOCIATION CURVE* OF BRAIN TISSUE
T. Middendorf and H. H. Loeschcke Washington NASA Aug. 1974 12 p refs Transl. into ENGLISH from Pfluegers Arch (West Ger.), v. 349, no. 1, 1974 p 1-8
(Contract NASw-2481)
(NASA-TT-F-15877) Avail: NTIS HC $4.00 CSCL 06P

An analysis of the acid-base balance and the CO2-binding capacity of the brain is presented. It is based on a linear titration curve for the cerebral proteins, the mass action laws for the *first dissociation of carbonic acid and the second dissociation of* phosphoric acid, the condition of electrical neutrality and finally the experimental buffer line based on the data of Kjallquist, the total phosphate ion and protein concentration of McIlwain and Bachelard. The following values for the slope of the protein titration curve, an average isoelectric point of the proteins involved and the buffer base of the whole brain were obtained: 37.18 *meq/kg H20.pH: 5.718; 77 meq/kg H20. The CO2 dissocia*tion curve derived from these data approximates the experimental data of Kjallquist. Author

N74-31566*# Linguistic Systems, Inc., Cambridge, Mass.
LUPUS INDUCED BY D-PENICILLAMINE DURING TREATMENT OF RHEUMATOID-ARTHRITIS: TWO CASES AND IMMUNOLOGICAL STUDY DURING TREATMENT
J. Cruzet, J. P. Camus, A. P. Leca, P. Guillien, and J. A. Lievre Washington NASA Aug. 1974 24 p Transl. into ENGLISH from Ann. Med. Intern. (France), v. 125, no. 1, 1974 p 71-79
(Contract NASw-2482)
(NASA-TT-F-15738) Avail: NTIS HC $4.25 CSCL 06E

In investigations of Lupus induced by D-Penicillamine during treatment for rheumatoid arthritis, the course of two cases is described in detail. Then, results of a study of 25 arthritics for biological signs of Lupus during D-Penicillamine treatment of rheumatoid arthritics are examined. The cases and systematic survey confirm findings in the literature and allows definition of general clinical and biological aspects of this syndrome which appear after 10 months of treatment. Author

N74-31567*# Kanner (Leo) Associates, Redwood City, Calif.
BETA-FETOPROTEIN IN SYSTEMIC LUPUS ERYTHEMATOSUS
S. S. Vasileyskiy, V. A. Nasonova, R. V. Petrov, and O. M. Folomeyeva Washington NASA Aug. 1974 19 p refs Transl. into ENGLISH from Terapevt. Arkh. (Moscow), v. 46, no. 3, 1974 p 137-143
(Contract NASw-2481)
(NASA-TT-F-15874) Avail: NTIS HC $4.00 CSCL 06E

Data are presented on clinical-laboratory study of 14 systemic lupus erythematosus patients including descriptions of *antiserum* production, immunoelectrophoresis procedures and the age and length of disease distribution of the patients. Detailed case histories are presented for three patients, in whom beta 2-fetoprotein was found. It is concluded that further research is necessary for accumulation of data on the diagnostic and prognostic value of the appearance of beta2-fetoprotein and use of systemic lupus *erythematosus as a model of an autoimmune disease system in* solution of problems in immunogenesis. A more direct comparison of beta2-fetoprotein with the IgM(S) monomer should be made.
Author

N74-31568*# Linguistic Systems, Inc., Cambridge, Mass.
INFLUENCE OF HYPOKINESIA AND A *DIET* COMPOSED OF HOMOGENIZED PRODUCTS ON THE FUNCTIONAL STATE OF THE HUMAN ORGANISM

P. I. Yegorov, V. S. Dupik, and N. P. Yermakova Washington NASA Aug. 1974 5 p Transl. into ENGLISH from Probl. Kosm. Medit. (Moscow), 1966 p 162-163
(Contract NASw-2482)
(NASA-TT-F-15730) Avail: NTIS HC $4.00 CSCL 06P

Four human subjects 21-29 years old were kept in horizontal position for 7 days in limited isolation. Two received a special homogenized diet. Two received a normal diet; calorie content and chemical composition were identical. Effects of isolation and diet were noted: decrease in respiration exchange in all subjects; cardiovascular changes, orthostatic instability, transitory gastrointestinal tract effects, weight loss, change in mineral volume, and auditory analyzer changes. Author

N74-31569*# California Univ., San Diego.
[RESEARCH PROGRESS IN RADIATION DETECTORS, PATTERN RECOGNITION PROGRAMS, AND RADIATION DAMAGE DETERMINATION IN DNA] Final Report, 1 Oct. 1972 - 31 Oct. 1973
Norman A. Baily 31 Oct. 1973 17 p
(Grant NGL-05-009-103)
(NASA-CR-139664) Avail: NTIS HC $4.00 CSCL 06R

The radiological implications of statistical variations in energy deposition by ionizing radiation were investigated in the conduct of the following experiments: (1) study of the production of secondary particles generated by the passage of the primary radiation through bone and muscle; (2) the study of the ratio of nonreparable to reparable damage in DNA as a function of different energy deposition patterns generated by X rays versus heavy fast charged particles; (3) the use of electronic radiography systems for direct fluoroscopic tomography and for the synthesis of multiple planes and; (4) the determination of the characteristics of systems response to split fields having different contrast levels, and of minimum detectable contrast levels between the halves under realistic clinical situations. A.A.D.

N74-31570*# University of Southern Calif., Los Angeles. Dept. of Physiology.
ROLE OF ATRIAL RECEPTORS IN THE CONTROL OF SODIUM EXCRETION Final Report
John R. Meehan and James P. Henry 10 Apr. 1973 18 p refs
(Grant NGR-05-018-122)
(NASA-CR-139677) Avail: NTIS HC $4.00 CSCL 06P

Responses of an innervated and a contralateral chronically denervated kidney to mild positive pressure breathing are compared for saline volume expansions in chloralose anesthetized dogs. It is shown that mild pressure breathing significantly reduces sodium excretion, urine flow, free water clearance, and PAH clearance. After 20 minutes of positive pressure breathing, both kidney responses are identical suggesting the release of natriuretic hormone which reduces renal function in addition to the demonstrated change in renal nerve activity. Increase of the left atrial pressure through balloon obstruction of the mitral orifice increases urine flow, sodium excretion and PAH clearance; inflation of the balloon and positive pressure breathing again depresses renal function. Preliminary evidence indicates that receptors in the right atrium are more severely affected by pressure breathing than those in the left atrium. G.G.

N74-31571*# Abilene Christian Coll., Tex.
QUANTITATIVE ECOLOGY AND DRY-HEAT RESISTANCE OF PSYCHROPHILES M.S. Thesis
Luther Winans, Jr. May 1974 116 p refs
(Grant NGR-44-095-001)
(NASA-CR-139667) Avail: NTIS HC $9.00 CSCL 06M

Microorganisms capable of growth at 7 C were enumerated and isolated from soil samples from the manufacture area (Denver, Colorado) and assembly area (Cape Kennedy, Florida) of the Viking spacecraft. Temperature requirements were determined for these isolates, and those growing at 3 C, but not at 32 C were designated as obligate psychrophiles in this investigation. These were identified to major generic groups, and the population density of obligate psychrophiles from the various groups was determined. Dry heat D-values were found for those spores that demonstrated growth or survival under a simulated Martian environment. Author

N74-31572*# Essex Corp., Alexandria, Va.
EARTH ORBITAL TELEOPERATOR SYSTEM MAN-MACHINE INTERFACE EVALUATION
Thomas B. Malone, Mark Kirkpatrick, Nicholas L. Shields, and Ronald G. Brye Jan. 1974 60 p refs Prepared in cooperation with Essex Corp., Huntsville, Ala.
(Contract NAS8-28298)
(NASA-CR-139598; H-4-1) Avail: NTIS HC $6.00 CSCL 05H

The teleoperator system man-machine interface evaluation develops and implements a program to determine human performance requirements in teleoperator systems. Author

N74-31573*# Midwest Research Inst., Kansas City, Mo.
DEVELOPMENT AND UTILIZATION OF TECHNOLOGY, CONTRIBUTIONS FROM NASA LIFE SUPPORT SYSTEMS: REFLECTIVE SUPERINSULATION MATERIALS Final Report
10 May 1974 35 p refs
(Contract NASw-2454; MRI Proj. 3720-D)
(NASA-CR-139596) Avail: NTIS HC $4.75 CSCL 06K

A case study is presented of a series of detailed investigations tracing the origins of new knowledge developed to solve specific problems of manned space exploration, and its subsequent modification and application to commercial needs. The differences that exist between the technology required for space exploration and the requirements for application to earthly problems are discussed along with the factors which determine the time required to convert new knowledge into viable economic benefits. Various case examples disclose differing patterns of technological development. By comparing the common and contrasting findings, it may be possible to understand better how new knowledge generates real benefits. Starting from a specific knowledge contribution previously identified from an analysis of astronaut life support requirements, the origins, adaptations, and eventual significance of the new technology are presented. Author

N74-31574*# Alabama Univ., Huntsville. School of Graduate Studies and Research.
RELATIVE DESIRABILITY OF LEISURE ACTIVITIES AND WORK PARAMETERS IN A SIMULATION OF ISOLATED WORK STATIONS Final Report, Nov. 1971 - Feb. 1974
Walter R. Sullins, Jr. and John G. Rogers Jul. 1974 59 p
(Grant NGL-01-008-001)
(NASA-CR-139651) Avail: NTIS HC $6.00 CSCL 05E

The kinds of activities that are attractive to man in long duration isolation are delineated considering meaningful work as major activity and a choice of leisure/living provisions. The dependent variables are the relative distribution between various work, leisure, and living activities where external constraints on the subject's freedom of choice are minimized. Results indicate that an average of at least five hours per day of significant meaningful work is required for satisfactory enjoyment of the situation; most other parameters of the situation have less effects on overall performance and satisfaction G.G.

N74-31575*# General American Transportation Corp., Niles, Ill. Research Div.
DEVELOPMENT OF AN INTEGRATED, ZERO-G PNEUMATIC TRANSPORTER/ROTATING-PADDLE INCINERATOR/CATALYTIC AFTERBURNER SUBSYSTEM FOR PROCESSING HUMAN WASTS ON BOARD SPACECRAFT Integrated Subsystem Performance Summary Report
S. F. Fields, L. J. Labak, and R. J. Honegger Jun. 1974 76 p refs
(Contract NAS2-6386)
(NASA-CR-114764) Avail: NTIS HC $7.00 CSCL 06I

A baseline laboratory prototype of an integrated, six man, zero-g subsystem for processing human wastes onboard spacecraft was investigated, and included a development of an operational specification for the baseline subsystem, followed by design and fabrication. The program was concluded by performing a series

of six tests over a period of two weeks to evaluate the performance of the subsystem. The results of the tests were satisfactory, however, several changes in the design of the subsystem are required before completely satisfactory performance can be achieved. Author

N74-31576*# North Carolina State Univ., Raleigh. Depts. of Psychology and Industrial Engineering.
EFFECTS OF NOISE UPON HUMAN INFORMATION PROCESSING
Harvey H. Cohen, Donald W. Conrad, John F. OBrien, and Richard G. Pearson Jun. 1974 67 p refs
(Grant NGL-34-002-055)
(NASA-CR-132469) Avail: NTIS HC $6.50 CSCL 05E

Studies of noise effects upon human information processing are described which investigated whether or not effects of noise upon performance are dependent upon specific characteristics of noise stimulation and their interaction with task conditions. The difficulty of predicting noise effects was emphasized. Arousal theory was considered to have explanatory value in interpreting the findings of all the studies. Performance under noise was found to involve a psychophysiological cost, measured by vasoconstriction response, with the degree of response cost being related to scores on a noise annoyance sensitivity scale. Noise sensitive subjects showed a greater autonomic response under noise stimulation. Author

N74-31577*# Techtran Corp., Glen Burnie, Md.
SPACESUIT JOINTS
M. Milkhiker Washington NASA Aug. 1974 6 p Transl. into ENGLISH from Tekh. Molodezhi (USSR), no. 6, 1974 p 27
(Contract NASw-2485)
(NASA-TT-F-15865) Avail: NTIS HC $4.00 CSCL 06K

A ball-and-socket joint to increase mobility in spacesuits was developed and successfully tested for its hermetic quality. The construction of the joint is briefly described and illustrated with photographs and a diagram. The two balls of the joint can be made of either metal or plastic with a hard molybdenum disulphide base coating for reducing friction. Adjacent connecting sections of the suit have a regular truncated cone shape and are off-center in relation to the joint; both measures are calculated to increase the angle of bending. Author

N74-31578*# Essex Corp., Alexandria, Va.
ROLE OF MAN IN FLIGHT EXPERIMENT PAYLOADS, PHASE 1
Thomas B. Malone and Mark Kirkpatrick 5 Jul. 1974 68 p refs
(Contract NAS8-29917)
(NASA-CR-120398) Avail: NTIS HC $6.50 CSCL 05E

The identification of required data for studies of Spacelab experiment functional allocation, the development of an approach to collecting these data from the payload community, and the specification of analytical methods necessary to quantitatively determine the role of man in specific Spacelab experiments are presented. A generalized Spacelab experiment operation sequence was developed, and the parameters necessary to describe each signle function in the sequence were identified. A set of functional descriptor worksheets were also drawn up. The methodological approach to defining the role of man was defined as a series of trade studies using a digial simulation technique. The tradeoff variables identified include scientific crew size, skill mix, and location. An existing digital simulation program suitable for the required analyses was identified and obtained. Author

N74-31579*# Essex Corp., Alexandria, Va.
ROLE OF MAN IN FLIGHT EXPERIMENT PAYLOADS, PHASE 1, APPENDICES 1 AND 2
Thomas B. Malone and Mark Kirkpatrick 5 Jul. 1974 212 p
(Contract NAS8-29917)
(NASA-CR-120398-APP-1-2) Avail: NTIS HC $13.75 CSCL 05E

The individual task durations are calculated in a series of time line realization problems, and a functional requirements data collection technique, designed to accommodate the data requirements for Spacelab payloads, is presented. A.A.D.

N74-31580# Meat Research Inst., Langford (England).
PERSONALITY AND SENSORY ACUITY
J. M. Harries Nov. 1973 11 p refs
(MRI-Memo-23) Avail: NTIS HC $4.00

The relationship between human extroversion scores to the assessment of meat texture in the mouth was studied by observing the difference in taste assessments completed on questionnaires and the results of food solution tests given in terms of concentration. Results indicate a relationship between extrovert personalities and less discriminating assessments of textural differences with consistently discriminating of juiciness differences in comparison with introvert personalities. G.G.

N74-31581*# Lockheed Missiles and Space Co., Sunnyvale, Calif.
THE DEVELOPMENT OF A NON-CRYOGENIC NITROGEN/OXYGEN SUPPLY SYSTEM Final Report
B. M. Greenough and R. E. Mahan Feb. 1974 131 p refs
(Contract NAS9-13051)
(NASA-CR-134300; LMSC/D401948) Avail: NTIS HC $9.75 CSCL 06K

A hydrazine/water electrolysis process system module design was fabricated and tested to demonstrate component and module performance. This module is capable of providing both the metabolic oxygen for crew needs and the oxygen and nitrogen for spacecraft leak makeup. The component designs evolved through previous R and D efforts, and were fabricated and tested individually and then were assembled into a complete module which was successfully tested for 1000 hours to demonstrate integration of the individual components. A survey was made of hydrazine sensor technology and a cell math model was derived. Author

N74-31582*# Martin Marietta Aerospace, Denver, Colo.
CONFIGURATION AND DESIGN STUDY OF MANIPULATOR SYSTEMS APPLICABLE TO THE FREE FLYING TELEOPERATOR, VOLUME 1: EXECUTIVE SUMMARY Final Report
J. R. Tewell Jul. 1974 81 p refs
(Contract NAS8-30266)
(NASA-CR-120402; MCR-74-290-Vol-1) Avail: NTIS HC $7.25 CSCL 05H

A preliminary design of a manipulator system, applicable to a free flying teleoperator spacecraft operating in conjunction with the shuttle or tug, is presented. A new control technique is proposed for application to the manipulator system. This technique, a range/azimuth/elevation rate-rate mode, was selected based upon the results of man-in-the-loop simulations. Several areas are identified in which additional emphasis must be placed prior to the development of the manipulator system. The study results in a manipulator system which will provide an effective method for servicing, maintaining, and repairing satellites to increase their useful life. Author

N74-31583*# Martin Marietta Aerospace, Denver, Colo.
CONFIGURATION AND DESIGN STUDY OF MANIPULATOR SYSTEMS APPLICABLE TO THE FREEFLYING TELEOPERATOR. VOLUME 2: PRELIMINARY DESIGN Final Report
J. R. Tewell, R. A. Spencer, J. J. Lazar, C. H. Johnson, R. A. Booker, D. A. Adams, G. M. Kyrias, R. P. Meirick, R. W. Stafford, and J. D. Yatteau Sep. 1974 395 p refs
(Contract NAS8-30266)
(NASA-CR-120403; MCR-74-290-Vol-2) Avail: NTIS HC $22.75 CSCL 05H

The preliminary design of a remotely controlled teleoperator for space application is reported that depends on man for control inputs and extends operation of the space shuttle. G.G.

N74-31584*# Scientific Translation Service, Santa Barbara, Calif.
WHAT EFFECT DOES THE WARNING OF REACTIONS HAVE ON THE REACTION TIME
Manfred Amelang and Frank Lasogga Washington NASA Sep. 1974 32 p refs Transl. into ENGLISH from Arch. fuer Exp.

und Angew. Psychol., v. 21, no. 1, 1974 p 1-24
(Contract NASw-2483)
(NASA-TT-F-15903) Avail: NTIS HC $4.75 CSCL 05E

Complex reaction time experiments were done with information signals indicating which reaction would be required in choice experiments. Reaction times decreased with increasing interval between information and starting signals, but were never shorter than reaction times in simple reaction time experiments. Longer exposure of the information signal gave longer reaction time. In other experiments in which interruption signals were given simultaneously with the start signals, reaction times were shorter when reactions occurred in spite of the interruption signal. Without the signal, times were longer because subjects waited for the interruption signal. Author

N74-31585*# Engineering-Science, Inc., Cincinnati, Ohio.
CORROSION CONTROL AND DISINFECTION STUDIES IN SPACECRAFT WATER SYSTEMS
T. G. Shea Mar. 1974 220 p refs
(Contract NAS9-9431)
(NASA-CR-140197) Avail: NTIS HC $14.00 CSCL 06K

Disinfection and corrosion control in the water systems of the Saturn 5 Orbital Workshop Program are considered. Within this framework, the problem areas of concern are classified into four general areas: disinfection; corrosion; membrane-associated problems of disinfectant uptake and diffusion; and taste and odor problems arising from membrane-disinfectant interaction. Author

N74-31586# Columbia Univ., New York. Psychophysics Lab.
DYNAMIC DEPTH PERCEPTION UNDER LABORATORY AND FIELD CONDITIONS Final Scientific Report
Eugene Galanter Mar. 1974 17 p refs
(Contract DADA17-68-C-8065)
(AD-779898; PLR-30) Avail: NTIS CSCL 05/10

The research was designed to assess the relations between judgments that people make and metric features of the environment (physical distance). Experiments were performed in which people made judgments of the vertical distance to an airplane that flew overhead at varying altitudes. A pilot experiment is reported of slant range judgments to aircraft at varying distances, at angles of thirty and sixty degrees above the horizon. Results of one experiment are included. These results show that judgments of time-to-touchdown of motion-picture simulations of landing approaches are unaffected by the experience of the observer or the steepness of the approach. (Modified author abstract) GRA

N74-31587# McDonnell-Douglas Astronautics Co., St. Louis, Mo.
MEDIA ADJUNCT PROGRAMMING: AN INDIVIDUALIZED MEDIA-MANAGED APPROACH TO ACADEMIC PILOT TRAINING Final Report, Feb. 1972 - Oct. 1973
Barbara Leherissey McCombs, Ruth Ann Marco, Mark W. Sprouls, A. John Eschenbrenner, and Gary B. Reid Mar. 1974 67 p refs
(Contract F41609-72-C-0015; AF Proj. 1123)
(AD-779950; AFHRL-TR-73-71(II)) Avail: NTIS CSCL 05/9

Media Adjunct Programming (MAP) techniques for presenting individualized, self-paced instruction were compared to traditional instructor-classroom (TIC) techniques in an undergraduate pilot weather course. The MAP group completed the course in significantly less time than the TIC group, representing a 29% time savings. In addition, MAP students performed equally as well on the post-test and retention test, had significantly lower state anxiety scores while learning the materials and reported significantly higher attitude scores toward the instructional method than TIC students. Predictions on the inverse relationship between state curiosity and state anxiety were partially supported, in that significant interactions were found between treatment conditions and flight groups. Possible factors contributing to flight group differences were discussed. Author (GRA)

N74-31588# Federal Aviation Administration, Washington, D.C. Office of Aviation Medicine.
PHYSIOLOGICAL, BIOCHEMICAL, AND PSYCHOLOGICAL RESPONSES IN AIR TRAFFIC CONTROL PERSONNEL: COMPARISON OF THE 5-DAY AND 2-2-1 SHIFT ROTATION PATTERNS
C. E. Melton, J. M. McKenzie, R. C. Smith, B. D. Polis, E. A. Higgens, S. M. Hoffmann, G. E. Funkhouser, and J. T. Saldivar Dec. 1973 19 p refs
(AD-778214/7; FAA-AM-73-22) Avail: NTIS HC $3.00 CSCL 05/10

Stress in controllers on the straight five-day shift was determined at Houston Intercontinental Tower in 1970. In 1971 controllers on the 2-2-1 rotation were studied at the same tower. Controllers generally prefer the 2-2-1 to the straight five-day schedule because of the long week end associated with the 2-2-1. Management is concerned that the quick turnaround on the 2-2-1 is a stressor that could compromise job performance. Physiological and psychological assessments showed no significant stress differences on the two schedules. On neither of the schedules did the controllers' stress levels differ from the general population. It was concluded that the stress differences on the two rotation patterns were too slight to be of real significance. GRA

N74-31589# Naval Postgraduate School, Monterey, Calif.
A STUDY OF DISPLAY DEVICES FOR FEEDBACK OF MEANINGFUL INFORMATION TO ELECTRO-ENCEPHALOGRAM SUBJECTS M.S. Thesis
Edward James Ohlert Mar. 1974 53 p refs
(AD-780946) Avail: NTIS CSCL 06/5

Types of tasking used in electro-encephalographic research were defined, and methods of displaying information in each tasking situation were considered. A special device for display of ASW phonograms was designed and built. Finally, a vertical display indicator group from an F-111B aircraft was obtained, and a simulated cockpit arrangement was designed incorporating this equipment. The implementation of this design will provide an advanced format for flight simulation tasking with displays particularly suited to biofeedback. (Modified author abstract) GRA

N74-32498 Rouen Univ. (France). Lab. de Physiologie.
RESPIRATION REGULATION MECHANISMS AT REST AND DURING MUSCULAR EXERCISE FOR HIGH ALTITUDE ACCLIMATIZATION AND FOR HUMANS BORN AT HIGH ALTITUDES Final Report [ETUDE DES MECANISMES DE REGULATION DE LA RESPIRATION AU REPOS ET PENDANT L'EXERCICE MUSCULAIRE AU COURS DE L'ACCLIMATATION A HAUTE ALTITUDE ET CHEZ L'HOMME NE A HAUTE ALTITUDE]
R. Lefrancois Sep. 1973 32 p refs In FRENCH
(Contract DGRST-68-01-286)
Avail: Issuing Activity

Respiratory acclimatization for humans born at sea level consists of three phases. During the first days, there is metabolic compensation of the respiratory alkalosis due to hypoxic hyperventilation; during the next few weeks, polyglobulin appears; finally, after 15 to 20 years there is no difference in respiratory regulation between humans born at sea level and those born at high altitudes. The experiments reported are concerned with sea level born humans after acclimatization. A comparison with indigenous personnel reveals hyperventilation, both at rest and during muscular exercise, due to enhanced sensitivity to molecular oxygen and carbon dioxide stimuli. The performance remains inferior to the natives. ESRO

N74-32499 Centre National de la Recherche Scientifique, Strasbourg (France). Centre d'Etudes Bioclimatiques.
IMMEDIATE AND RETARDED EFFECTS OF SLEEP PERTURBATION DUE TO FOUR AIRCRAFT TYPES OF NOISE Final Report [EFFETS IMMEDIATS ET EFFETS CONSECUTIFS DE LA PERTURBATION DU SOMMEIL PAR QUATRE TYPES DE BRUITS D'AVION]
B. Metz and P. Schieber Sep. 1973 51 p refs In FRENCH; ENGLISH summary
(Contract DGRST-69-01-623)
Avail: Issuing Activity

Four types of aircraft noise differing in peak intensity and duration were used to induce sleep perturbations in 20 young adults of both sexes. Immediate effects were characterized by transitory activation periods (TAP), the intensity of which depends on the noise intensity and type of sleep (slow wave or paradoxical sleep). The Tap are precursors to sleep cycle modifications with more frequent sleep type changes, increase in number and duration of awake periods, increase in time-to-sleep. The perturbations were correlated with performance tests and simple task modification on the next morning. The importance of the observed effects and interindividual variations, both objective and subjective, may be correlated with some personality characteristics of the subjects. ESRO

N74-32500*# Kanner (Leo) Associates, Redwood City, Calif.
INHABITED SPACE, PART 2
B. P. Konstantinov, ed. and V. D. Pekelis, ed. Washington NASA Jul. 1974 192 p refs Transl. into ENGLISH from the book "Naselennyy Kosmos" Moscow, Nauka Press, 1972 p 215-369
(Contract NASw-2481)
(NASA-TT-F-820) Avail: NTIS HC $5.50 CSCL 06F

Aspects of the search for extraterrestrial life, the possibility of interstellar flights, and juridical factors of lunar exploration are considered.

N74-32502* Kanner (Leo) Associates, Redwood City, Calif.
LIFE IN SPACE
N. M. Sisakyan *In its* Inhabited Space, Pt. 2 (NASA-TT-F-820) Jul. 1974 p 17-28 Transl. into ENGLISH from the book "Naselennyy Kosmos" Moscow, Nauka Press, 1972 p 229-239

CSCL 06F

Biotechnological aspects of manned space flight are reviewed and the basic biological problems of training and sustaining man in interplanetary flights are elaborated. G.G.

N74-32503* Kanner (Leo) Associates, Redwood City, Calif.
SPACE PSYCHOLOGY
V. V. Parin, F. D. Gorbov, and F. P. Kosmolinskiy. *In its* Inhabited Space, Pt. 2 (NASA-TT-F-820) Jul. 1974 p 29-41 Transl. into ENGLISH from the book "Naselennyy Kosmos" Moscow, Nauka Press, 1972 p 240-249

CSCL 05J

Psychological selection of astronauts considers mental responses and adaptation to the following space flight stress factors: (1) confinement in a small space; (2) changes in three dimensional orientation; (3) effects of altered gravity and weightlessness; (4) decrease in afferent nerve pulses; (5) a sensation of novelty and danger; and (6) a sense of separation from earth. G.G.

N74-32504* Kanner (Leo) Associates, Redwood City, Calif.
DETECTION OF LIFE IN SPACE
W. Corliss *In its* Inhabited Space, Pt. 2 (NASA-TT-F-820 Jul. 1974 p 42-52 Transl. into ENGLISH from the book "Naselennyy Kosmos" Moscow, Nauka Press, 1972 p 250-257

CSCL 06F

The selection of spacecraft experiments and equipment to detect extraterrestrial life outside earth centers on observations of chemical compounds similar to amino acids and proteins, on signs of metabolism in the form of nutrient absorption, and life form impressions in fossiles or signs of civilization. G.G.

N74-32505* Kanner (Leo) Associates, Redwood City, Calif.
LUNAR MICROCOSMOS **c05**
N. Pirie *In its* Inhabited Space, Pt. 2 (NASA-TT-F-820) Jul. 1974 p 53-61 Transl. into ENGLISH from the book "Naselennyy Kosmos" Moscow, Nauka Press, 1972 p 258-265

CSCL 06K

A human habitat on the lunar surface requires energy recycling metabolites based on the utilization of vegetative plants that are good photosynthesizers. Selection criteria involve reactions to fertilization by human excrements, suitability as food for man (with or without fractionation), physiological effects of prolonged ingestion of these plants, and technical methods for returning inedible portions back into the cycle. G.G.

N74-32511* Kanner (Leo) Associates, Redwood City, Calif.
SPACE AND MAN
E. Kolman *In its* Inhabited Space, Pt. 2 (NASA-TT-F-820) Jul. 1974 p 128-134 Transl. into ENGLISH from the book "Naselennyy Kosmos" Moscow, Nauka Press, 1972 p 318-326

CSCL 06P

The effects of man's entry into space on changes in economics and technology, politics and law, science, philosophy, and art are considered. A single world economy, extracting from the natural resources of the moon and other cosmic bodies raw materials and energy, will avoid terrestrial limitations and improve society by eliminating the inequalities of economic and social status. However, a spacecraft for interplanetary travel require thermonuclear engines that achieve an escape velocity of 0.1 times the speed of light in order to allow an astronaut stellar expedition corresponding to the active life of a single generation. G.G.

N74-32517# Civil Aeromedical Inst., Oklahoma City, Okla.
FLYING HIGH: THE AEROMEDICAL ASPECTS OF MARIJUANA
Mark F. Lewis (New Mexico Univ.) and Douglas P. Ferraro (New Mexico Univ.) Dec. 1973 7 p refs
(AD-775889; FAA-AM-73-12) Avail: NTIS HC $4.00

A summary of the discussions from the GAMI symposium on aeromedical aspects of marijuana is presented. The invited panel discussed the legal aspects of marijuana use and aviation, the experience of military aviation, and the acute and chronic effects of the drug. For civil aviation, the panel proposed: (1) a 12 to 16 hour period between marijuana use and work in aviation, (2) no radical changes in FAA policy towards marijuana use, and (3) additional research on aeromedical aspects of marijuana. Author

N74-32518*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
MEASUREMENT OF GAS PRODUCTION OF MICROORGANISMS Patent Application
Judd R. Wilkins, Stacey M. Mills, and Albin O. Pearson, inventors (to NASA) Filed 24 Jul. 1974 20 p
(NASA-Case-LAR-11326-1; US-Patent-Appl-SN-491416) Avail: NTIS HC $4.00 CSCL 06M

A simple apparatus and method are disclosed for measuring gas production by microorganisms using a pressure transducer to sense pressure built-up by members of the ENTEROBACTERIACEAE group of bacteria. The test system consists of a 5.0 psid pressure transducer and a pressure equalizer valve attached to the metal cap of a 20 x 150 mm test tube with gas pressure being recorded on a strip chart recorder. NASA

N74-32519# Defence and Civil Inst. of Environmental Medicine, Downsview (Ontario).
BLOOD-BUBBLE INTERACTION IN DECOMPRESSION SICKNESS
Kenneth N. Ackles, ed. Dec. 1973 301 p refs Presented at an Intern. Symp. at Downsview, Ontario
(DCIEM-73-CP-960) Avail: NTIS HC $18.25

The texts of papers are presented, along with discussion recorded during a conference concerning the pathophysiology and treatment of blood-bubble phenomena during decompression sickness. The following items are among the topics discussed: (1) the historical evolution of the blood-bubble interaction hypothesis; (2) the physiology of blood platelets; (3) biochemical indicators of decompression sickness; (4) the ultrastructure of the blood-bubble interface; (5) experimental evidence in support of the hypothesis that intravascular bubbles activate the hemostatic process; (6) the role of gas embolism in decompression sickness; (7) evaluation of clotting factors during hyperbaric exposure; and (8) the possible effects of bubble induced coagulation following decompression. A.A.D.

N74-32520# Institute of Ophthalmology, London (England). Dept. of Experimental Ophthalomology.
LASERS AND THE ANTERIOR SEGMENT OF THE EYE
E. S. Perkins Nov. 1972 40 p refs
(FPRC/1318) Avail: NTIS HC $5.00

The effects of lasers of different wavelengths on the cornea, lens and iris are described and a comparison is made with a conventional photocoagulator. The production of an iridotomy by a laser is described and its clinical value discussed. Author

N74-32521# Royal Air Force Inst. of Aviation Medicine, Farnborough (England).
THE GENERATION OF SACCADIC EYE MOVEMENTS IN VESTIBULAR NYSTAGMUS
G. P. Barnes Sep. 1973 36 p refs
(FPRC/1325) Avail: NTIS HC $5.00

A model has been developed for the mechanism of saccadic generation in the vestibulo-ocular reflex arc, in an attempt to explain variations in the pattern of nystagmic response to vestibular stimulation. The model has been developed using an analogue computer and an attempt has been made to relate the system to the known physiological evidence. Author

N74-32522# Civil Aeromedical Inst., Oklahoma City, Okla.
AVIATION MEDICINE TRANSLATIONS: ANNOTATED BIBLIOGRAPHY OF RECENTLY TRANSLATED MATERIAL, 8
Gregory N. Constant, D. R. Goulden, and E. Jean Grimm Dec. 1973 9 p
(AD-776136; FAA-AM-73-19) Avail: NTIS HC $4.00

An annotated bibliography of translations of foreign language articles is presented. The 22 listed entries are concerned with studies of equilibration tests, vestibular function, opto-kinetic nystagmus, electronystagmography, cardiovascular reactions to noise stress, stress and performance, aptitudes for flying, facial reconstruction techniques in the identification of human remains from accidents, attitudes and performance of air traffic controllers, techniques for determining levels of carbon monoxide in the blood, noise, vision, cardiology, flight safety, and animal responses to sonic booms. Procedures for obtaining copies of the translations are included. Author

N74-32523# Civil Aeromedical Inst., Oklahoma City, Okla.
HEIGHT AND WEIGHT ERRORS IN AEROMEDICAL CERTIFICATION DATA
Michael T. Lategola, Clyde A. Lynn, Earl D. Folk, Charles F. Booze, Jr., and Peggy J. Lyne Jun. 1973 7 p refs
(AD-773452; FAA-AM-73-10) Avail: NTIS HC $4.00

The Framingham Relative Weight Index (FRWI) of obesity was described in previous reports as a screening aid for detecting susceptibility to coronary heart disease (CHD). FRWI calculation requires measured values of height and weight but the height and weight values on standard airman medical applications are usually stated estimates of the examinee. Because such stated (unmeasured) data are vulnerable to error samples from aeromedical certification sources were examined for errors. In a previous study 674 Air Traffic Controllers (ATC) stated their heights at 65 inches or less. Of 216 corborated errors 179 were due to incorrectly stated height. In a separate study, the stated and measured weights, of 206 ATC personnel were compared. Due to weight understatement by grossly overweight individuals, the 120.0% FRWI classification of obesity based on stated weight is quite conservative. Author

N74-32524*# Scientific Translation Service, Santa Barbara, Calif.
TREATMENT OF SYSTEMIC LUPUS ERYTHEMATOSUS WITH NEPHROPATHY BY MEANS OF CHLORAMBUCIL
Washington NASA Aug. 1974 9 p ref Transl. into ENGLISH from Rev. Clin. Espan. (Spain), v. 132, no. 5, 15 Mar. 1974 p 473-474
(Contract NASw-2483)
(NASA-TT-F-15897) Avail: NTIS HC $4.00 CSCL 06E

A review of American and foreign research results is presented with the drug chlorobrucil in the treatment of kidney disease, as well as the side effects. Author

N74-32525*# SCI Systems, Inc., Houston, Tex. Biomedical Engineering Dept.
VIDEO REQUIREMENTS FOR REMOTE MEDICAL DIAGNOSIS Final Report
Jerry G. Davis Jun. 1974 92 p refs
(Contract NAS9-13118)
(NASA-CR-134395) Avail: NTIS HC $7.75 CSCL 06B

Minimal television system requirements for medical telediagnosis were studied. The experiment was conducted with the aid of a simulated telemedicine system. The first step involved making high quality videotape recordings of actual medical examinations conducted by a skilled nurse under the direction of a physician watching on closed circuit television. These recordings formed the baseline for the study. Next, these videotape recordings were electronically degraded to simulate television systems of less than broadcast quality. Finally, the baseline and degraded video recordings were shown (via a statistically randomized procedure) to a large number of physicians who attempted to reach a correct medical diagnosis and to visually recognize key physical signs for each patient. By careful scoring and analysis of the results of these viewings, the pictorial and diagnostic limitations as a function of technical video characteristics were to be defined. Author

N74-32526*# Alabama Univ., Birmingham. Lab. of Molecular Biology.
A MODEL FOR THE COEVOLUTION OF THE GENETIC CODE AND THE PROCESS OF PROTEIN BIOSYNTHESIS Semiannual Progress Report
8 Jan. 1974 19 p refs
(Grant NGR-01-010-001)
(NASA-CR-140018) Avail: NTIS CSCL 06A

Work accomplished toward exploration of a model for the coevolution of the genetic code includes the following: (1) aminoacyl adenylate anhydrides are readily converted in high yield to aminoacyl imidazoles; (2) aminoacyl groups can be transferred from imidazole to polyribonucleotides; (3) peptides can be formed from glycylated poly U; (4) glycyl imidazole is more stable at all pHs than N-acetyl glycyl imidazole; (5) aminoacyl transfer reactions in contemporary biosystems are mediated by histidine residues in enzymes; and (6) intramolecular interactions between amino acid side chains and nucleotide bases have been observed in N-acetylphenylalanyl poly A and poly U as indicated by ultraviolet and circular dichroic spectra. Author

N74-32527*# Scientific Translation Service, Santa Barbara, Calif.
SCREENING OF ANTINUCLEAR FACTORS IN RHEUMATIC DISEASES
H. A. Menard, D. Myhal, M. Camerlain, and A. Lussier Washington NASA Sep. 1974 15 p refs Transl. into ENGLISH from Union Med. Can. (Canada), v. 103, no. 4, 1974 p 722-726
(Contract NASw-2483)
(NASA-TT-F-15843) Avail: NTIS HC $4.00 CSCL 06E

Experience with a screening method for antinuclear antibodies which uses indirect immunofluorescence on formalinized chicken red cells nuclei as substrate is discussed. The method is inexpensive, easy to standardize, easy to perform, and presents a sensitivity and specificity comparable to classical methods. Sera and synovial fluids from patients with rheumatic diseases were screened. A discussion of the technical aspects and the clinical applications is included. Author

N74-32528*# Kanner (Leo) Associates, Redwood City, Calif.
PROJECTIONS OF THE VESTIBULAR NERVES TO THE SUPRASYLVIAN AND POSTCRUCIATE CORTICAL AREAS IN THE CHLORALOSED CAT
M. Roucoux-Hanus and N. Boisacq-Schepens Washington NASA Sep. 1974 23 p refs Transl. into ENGLISH from Arch. Ital. Biol. (Italy), v. 112, 1974 p 60-76
(Contract NASw-2481)
(NASA-TT-F-15900) Avail: NTIS HC $4.25 CSCL 06C

A comparative study of the projection of vestibular afferents to the postcruciate dimple and to the primary vestibular area is given. The results obtained with three different recording methods, revealed a localized site of relatively early vestibular response in the deep cruciate sulcus, and indicated the primary nature of the vestibular projection to the suprasylvian cortex and the abundance of vestibulosomatic convergence in the cortical areas studied. Author

N74-32529# Civil Aeromedical Inst., Oklahoma City, Okla. Medical Statistical Section.
PREVALENCE AND INCIDENCE OF DISEASE AMONG AIRMEN MEDICALLY CERTIFIED DURING 1965
Charles F. Booze, Jr. Apr. 1973 27 p refs
(AD-773544; FAA-AM-73-8) Avail: NTIS HC $3.75

This historical prospective study follows some 306,000 airmen medically certified during 1965 through December 1969 to observe prevalence and incidence of disease among these airmen. It also considers possible contribution of medical factors to attrition of airmen from an active status as a follow-up to a previous study concerning characteristics of airmen involved in attrition. Abdominal and cardiovascular diseases represented the greatest incidence for the total study group and the still active sub-group. Miscellaneous conditions, i.e., skin diseases, endocrinopathies, allergies, and general systemic conditions, were slightly more important among the attrition sub-group. Overall, the attrition subgroup demonstrated the highest prevalence and incidence of disease for the study period. However, 86% of the attrition sub-group had no recorded disease, thus diminishing the apparent importance of medical factors as a primary motivator for attrition. Author

N74-32530*# Harding Coll., Searcy, Ark.
PROGRAM TO STUDY OPTIMAL PROTOCOL FOR CARDIOVASCULAR AND MUSCULAR EFFICIENCY Progress Report, 1 Jan. - 30 Jun. 1974
Harry D. Olree 30 Jun. 1974 33 p refs
(Contract NAS9-14134)
(NASA-CR-140224) Avail: NTIS HC $4.75 CSCL 06P

Training programs necessary for the development of optimal strength during prolonged manned space flight were examined, and exercises performed on the Super Mini Gym Skylab 2 were compared with similar exercises on the Universal Gym and calisthenics. Cardiopulmonary gains were found negligible but all training groups exhibited good gains in strength. Author

N74-32531*# General Electric Co., Houston, Tex. Space Div.
BIOMEDICAL PROGRAMS OPERATIONS PLANS Final Report
H. F. Walbrecher 30 Aug. 1974 193 p
(Contract NAS9-11037)
(NASA-CR-140223) Avail: NTIS HC $12.75 CSCL 06D

Operational guidelines for the space shuttle life sciences payloads are presented. An operational assessment of the medical experimental altitude test for Skylab, and Skylab life sciences documentation are discussed along with the operations posture and collection of space shuttle operational planning data. F.O.S.

N74-32532*# Aerojet Medical and Biological Systems, El Monte, Calif.
CASSETTE BACTERIA DETECTION SYSTEM Final Report
1 Aug. 1974 95 p
(Contract NAS9-13256)
(NASA-CR-140229; Rept-1110F) Avail: NTIS HC $7.75 CSCL 06M

The design, fabrication, and testing of an automatic bacteria detection system, with a zero-g capability, based on the filter-capable approach, and intended for monitoring the sterility of regenerated water in spacecraft is discussed. The principle of detection is based on measuring the increase in chemiluminescence produced by the action of bacterial porphyrins on a luminol-hydrogen peroxide mixture. Viable organisms are detected by comparing the signal of an incubated water sample with an unincubated control. High signals for the incubated water sample indicate the presence of viable organisms. Author

N74-32533*# Kanner (Leo) Associates, Redwood City, Calif.
STUDY OF WEIGHTLESSNESS AND PERTURBATION OF THE RHYTHMS OF THE GASTROINTESTINAL SYSTEM OF ANIMALS AND HUMAN BEINGS
J. Thouvenot and C. Gaudeau Washington NASA Sep. 1974 46 p refs Transl. into ENGLISH of "Etude de l'Agravite et des Perturbations des Rythmes sur le Tractus Gastro-Intestinal chez l'Animal et chez l'Homme", Rept. ESRO-SP73 ESRO Space Biol. Related to the Post-Apollo Programme, Paris, Aug. 1971 p 352-389
(Contract NASw-2481)
(NASA-TT-F-15925; ESRO-SP-73) Avail: NTIS HC $5.50 CSCL 06G

Skin electrodes have been used to study the responses of the gastrointestinal system to weightlessness, with special attention to biorhythms. Future areas of study are outlined, including comparison of these responses to those of the cardiac, respiratory and nervous systems. The relative usefulness of immersion experiments, the problems of venous pooling and respiratory mechanics during space flight, psychological concerns, possible use of the astronauts to answer questions of cell biology (hair and fingernail growth, wound healing) and the problem of bacteria growth in space, are discussed. Author

N74-32534*# New York Univ., N.Y.
BIOLOGICAL EFFECTS OF RADIATION, METABOLIC AND REPLICATION KINETICS ALTERATIONS Final Report
Joseph Post 31 Dec. 1972 19 p refs
(Grant NGR-33-016-102)
(NASA-CR-139689) Avail: NTIS HC $4.00 CSCL 06R

The biological effects of radiation upon normal and cancerous tissues were studied. A macromolecular precursor of DNA, 3ETdR, was incorporated into the cell nucleus during synthesis and provided intranuclear beta radiation. Tritium labeled cells were studied with autoradiographic methods; cell cycle kinetics were determined and cell functions modified by radiation dosage or by drugs were also evaluated. The long term program has included: (1) effects of radiation on cell replication and the correlation with incorporated dose levels, (2) radiation induced changes in cell function, viz., the response of beta irradiated spleen lymphocytes to antigenic stimulation by sheep red blood cells (SRBC), (3) kinetics of tumor and normal cell replication; and (4) megakaryocyte formation and modification by radiomimetic drugs. Author

N74-32535*# Massachusetts Inst. of Tech., Cambridge. Man-Vehicle Lab.
RESEARCH ON BIOPHYSICAL EVALUATION OF THE HUMAN VESTIBULAR SYSTEM Final Report
L. R. Young Aug. 1974 86 p refs
(Grant NGR-22-009-156)
(NASA-CR-140063) Avail: NTIS HC $7.50 CSCL 06P

The human vestibular function was studied by the combined approach of advanced measurement and mathematical modelling. Fundamental measurements of some physical properties of endolymph and perilymph, combined with nystagmus measurements and fluid mechanical analysis of semicircular canal function furthered the theory of canal mechanical response to angular acceleration, caloric stimulation and relating linear acceleration. The effects of adaptation seen at low frequency angular stimulation were studied and modelled to remove some shortcomings of the torsion pendulum models. Otolith function was also studied experimentally and analytically, leading to a new set of models for subjective orientation. Applications to special problems of space, including the case of rotating spacecraft were investigated and the interaction of visual and vestibular cues and their relation to proprioceptive information was explored relative to postural control. Author

N74-32536*# Little (Arthur D.), Inc., Cambridge, Mass.
EVALUATION OF POSSIBLE INTERACTION AMONG DRUGS CONTEMPLATED FOR USE DURING MANNED SPACE FLIGHTS. PART 1: SUMMARY FROM PROGRESS REPORT DATED 31 OCTOBER 1973. PART 2: PROGRESS REPORT FOR THE PERIOD NOVEMBER 1973 TO JUNE 1974 Final Report, Jul. 1972 - Jun. 1974
31 Jul. 1974 67 p refs
(Contract NAS9-12970)
(NASA-CR-140248; C-74804-PT-1; C-74804-Pt-2) Avail: NTIS HC $6.50 CSCL 06E

Possible interactions among drugs contemplated for use during manned spaceflights have been studied in several animal species. The following seven drugs were investigated: nitrofurantoin, chloral hydrate, hexobarbital, phenobarbital, flurazepam, diphenoxylate, and phenazopyridine. Particular combinations included: chloral hydrate, hexobarbital or flurazepam with nitrofurantoin; phenobarbital or flurazepam with phenazopyridine; and diphenoxylate with two dose formulations of nitrofurantoin. The mechanism of action and an explanation of the interaction between diphenoxylate and nitrofurantoin still remains unclear. In man, the interaction does not appear to be significant, affecting only two subjects out of six and with only one dose formulation (Furadantin). Author

N74-32537*# Kanner (Leo) Associates, Redwood City, Calif.
SPACE RESEARCH IN THE UKRAINE. NO. 4: SPACE BIOLOGY AND MEDICINE
N. N. Sirotinin Washington NASA Sep. 1974 127 p refs Transl. into ENGLISH from Kosmich. Issled. Ukr. (Kiev), no. 4, 1973 p 1-80
(Contract NASw-2481)
(NASA-TT-F-15921) Avail: NTIS HC $9.50 CSCL 06C

The principal extremal effects are discussed to which astronauts may be subjected during space flight: Depressurization and decompression (amounting in the main to anoxia), gravitation and weightlessness, and hypokinesia and kinetosis. The prophylaxis and therapy of these conditions are indicated. Also described are how to provide astronauts with water that is regenerated and preserved under spacecraft conditions and how to cultivate algae that can serve as a source of oxygen and food. Author

N74-32538# Royal Aircraft Establishment, Farnborough (England).
HEARING LOSS DUE TO TANK NOISE
Dieter Wiegand Apr. 1974 25 p refs Transl. into ENGLISH from Erprobungsstelle 41 der Bundeswehr, Trier, 1973
(RAE-Lib-Trans-1748; BR41687) Avail: NTIS HC $4.25

The dependence of hearing loss on exposure to tank noise was investigated. Audiograms were obtained for 81 tank test drivers and 49 engine test bed operators, account being taken of age and exposure duration, and the results for monaural and binaural hearing loss evaluated by various procedures. The results show a high proportion of hearing loss from tank noise. The estimated extent of the hearing loss is dependent on the method of measurement and the procedures used for evaluating hearing loss from the audiogram. It is considered that personal hearing protection against noise is of only limited effectiveness, and measures for reduction must be taken mainly at the noise source itself. Author

N74-32539# European Space Research Organization, Paris (France).
EFFECT OF PRECEDING EXPOSURE TO ALTITUDE ON HIGH PRESSURE DECOMPRESSION IN THE RAT
Klaus Peter Schmalenbach Jun. 1974 50 p refs Transl. into ENGLISH of Tierexptl. Dekompressionsvers. nach Hoehenexposition, DLR-FB-73-87, DFVLR, 3 Jul. 1973
(ESRO-TT-68; DLR-FB-73-87) Avail: NTIS HC $5.50; DFVLR Porz, West Ger. 16.50 DM

Rats were exposed to a simulated altitude of 4000 m for 2, 31, 72, and 168 hours. Rats and a control-series were then rapidly decompressed from 12 kp/sq cm to atmospheric pressure. Comparison of mortalities after decompression showed a significant decrease of the mortality in the rats exposed to altitude for 168 hours. Shorter periods of hypoxia induced no significant effect. The influence of adaptation to altitude on the bubble formation during high pressure decompression and on the post-decompression shock is discussed. Author (ESRO)

N74-32540# European Space Research Organization, Paris (France).
VIBRATION AND ACUTE ANOXIA
Hermann-Josef Erich Lenders Jun. 1974 59 p refs Transl. into ENGLISH of Vibration u. Akuter Sauerstoffmangel, DLR-FB-73-96, DFVLR 6 Aug. 1973
(ESRO-TT-73; DLR-FB-73-96) Avail: NTIS HC $6.00; DFVLR, Porz, West Ger. 18.70 DM

The influence of vibration on the oxygen deficit tolerance was dealt with. In a decompression run to a simulated altitude of 12,000 m, 240 albino rats were exposed to a quasi-sinusoidal oscillation with a frequency of 34 Hz and an amplitude of 1.075 mm. The result was a significant increase of the mortality rate of the vibrated rats as compared with control animals. Possible causal factors underlying the experimental results are discussed. Author (ESRO)

N74-32541# Perceptronics, Inc., Woodland Hills, Calif.
ADAPTIVE COMPUTER AIDING IN DYNAMIC DECISION PROCESSES. PART 1: ADAPTIVE DECISION MODELS AND DYNAMIC UTILITY ESTIMATION Semiannual Technical Report, 1 Oct. 1973 - 1 Apr. 1974
Amos Freedy, Richard Weisbrod, Kent Davis, Donald May, and Gershon Weltman 1 May 1974 64 p refs
(Contract N00014-73-C-0286; ARPA Order 2347; NR Proj. 196-128)
(AD-780953; PTR-1016-74-5(1); SATR-4) Avail: NTIS CSCL 05/10

The report describes the implementation of a system for adaptive computer aiding in dynamic decision processes and provides theoretical background for some of the underlying techniques. The report is presented in two parts under separate covers. Part I, Adaptive Decision Models and Dynamic Utility Estimation, includes (1) a description of the adaptive decision model for the decision task; (2) a presentation of the concept of dynamic utility and a technique, based on machine learning principles, for adaptive on-line estimation of these utilities; (3) a description of the overall system and software; and (4) the overall objectives and approach for an experimental program involving the system. (Modified author abstract) GRA

N74-32542# Kentucky Univ., Lexington. Wenner-Gren Research Lab.
A STANDARD PSYCHOPHYSIOLOGICAL PREPARATION FOR EVALUATING THE EFFECTS OF ENVIRONMENTAL VIBRATION STRESS. PHASE 2: IMPLEMENTATION
E. P. McCutcheon, R. G. Edwards, J. M. Evans, J. F. Lafferty, and D. F. McCoy Feb. 1974 192 p refs
(Contract F33615-72-C-1112; AF Proj. 7231)
(AD-781092; AMRL-TR-73-118) Avail: NTIS CSCL 06/19

A Standard Psychophysiological Preparation (SPP) for the evaluation of the physiological and biomechanical mechanisms responsible for performance decrement during repeated, long term exposure to vibration has been developed. The SPP is comprised of a trained Rhesus monkey, chronically implanted with probes to measure cardiovascular, hormonal and thermal parameters, with provisions for external measurements of the ECG, skin temperature, oxygen consumption, biomechanical parameters and performance level. Implementation of the SPP concept verifies the applicability and utility of the SPP and demonstrates the high quality, quantitative physiological and biomechanical data can be obtained with multiple systems from a performing subject during vibration exposure. Performance level, cardiovascular parameters, and biomechanical response of the SPP are presented as a function of vibration frequency and acceleration amplitude.
Author (GRA)

N74-32543# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.
PROCEEDINGS OF THE 4TH ANNUAL CONFERENCE ON ENVIRONMENTAL TOXICOLOGY Final Report
Dec. 1973 438 p refs Conf. held at Fairborn, Ohio, 16-18 Oct. 1973
(Contract F33615-73-C-4059; AF Proj. 6302)
(AD-781031; AMRL-TR-73-125) Avail: NTIS CSCL 06/20

The report is a compilation of the papers presented at the Proceedings of the 4th Annual Conference on Environmental Toxicology, sponsored by the University of California, Irvine and held in Fairborn, Ohio on 16, 17, and 18 October 1973. Major technical areas discussed included Toxic Substance Control Act of 1973: toxicology of halogenated solvents, aerosol propellants, and fire extinguishants: and toxicology of propellant, materials and assessment of carbinogenesis to certain materials.
Author (GRA)

N74-32544# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
ANALYSIS OF THE DYNAMIC RESPONSE OF THE HUMAN VERTEBRAL COLUMN M.S. Thesis
George M. P. Marton Mar. 1974 102 p refs
(AD-780627; GAW/MC/74-6) Avail: NTIS CSCL 06P

The development of a model of the human vertebral column is investigated. The model is assumed to consist of only linear elements and only axial response is considered. The intervertebral disc is modelled by a chain of Kelvin elements in series with an impact spring. The vertebra is modelled by a Maxwell element in parallel with a spring and in series with a mass. The response of the model is shown to correspond closely to impedance results at the elemental level but the model of the combination of three vertebrae and two discs gives results which are low when compared to experimental impedance results.
Author (GRA)

N74-32545# Naval Aerospace Medical Research Lab., Pensacola, Fla.
INDIVIDUAL DIFFERENCES IN VESTIBULAR INFORMATION AS A PREDICTOR OF MOTION DISTURBANCE SUSCEPTIBILITY
H. J. Moore and Fred E. Guedry, Jr. 23 Apr. 1974 23 p refs
(AD-781881; NAMRL-1200; USAARL-74-11) Avail: NTIS CSCL 05/10

Certain facts suggest that motion disturbance may be related to the amount of vestibular information contributing to sensory conflict. Individual differences in motion disturbance susceptibility might, therefore, correlate positively with differential accessibility of vestibular sensory information to the spatial perceptual process. The results of two experiments, while not inconsistent with this hypothesis, did not demonstrate a relationship between a vestibular response variance measure and motion disturbance susceptibility at the conventional significance level. The test-retest reliability of the response variance measure was not found to be favorable. The slope of the vestibular stimulus-response relationship was not found to predict motion disturbance susceptibility.
Author (GRA)

N74-32546* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
FLEXIBLE JOINT FOR PRESSURIZABLE GARMENT Patent
William Elkins (Garrett Corp., Los Angeles), Eugene W. Connell (Garrett Corp., Los Angeles), and Robert E. Alesna, inventors (to NASA) (Garrett Corp., Los Angeles) Issued 3 Sep. 1974 10 p Sponsored by NASA
(NASA-Case-MSC-110/72; US-Patent-3,832,735; US-Patent-Appl-SN-689455; US-Patent-Class-2-2.1A; US-Patent-Class-2-82; US-Patent-Class-156-218) Avail: US Patent Office CSCL 06Q

A flexible joint for a pressurizable garment is described which has two fabric layers bonded together. The lay of one layer is straight cut and the other of bias cut. A ring-like tension member covered with Teflon disposed at the minor diameter of each joint convolution, is unrestrained other than being retained in the flexure plane. A compression ring is secured at the major diameter, at certain of the convolutions, preferably alternate ones. A pair of axially disposed cable joint restraints at the convolution periphery are disposed in a plane normal to the flexure plane.
Official Gazette of the U.S. Patent Office

N74-32547 Radiotechniques S. A., Caen (France). Lab. de Recherches et de Developpements Avances.
APPLICATION OF SEMICONDUCTOR MICROPROBES TO CARDIOVASCULAR AND RENAL HEMODYNAMICS Final Report [APPLICATION DES MICROCAPTEURS A SEMI-CONDUCTEUR A L'ETUDE DE L'HEMODYNAMIQUE CARDIOVASCULAIRE ET RENALE]
G. Forcinal 2 Jul. 1973 46 p In FRENCH
(Contract DGRST-72-70-067)
Avail: Issuing Activity

The development of a semiconductor for in vivo recording krypton 85 beta emission is presented. The mechanical, electrical, and nuclear requirements are reviewed together with principles of the specific semiconductor detector type considered and problems associated with radiation counting in continuous media. The technologies used are detailed and compared with a view to choosing between lithium outside or boron outside. The results obtained with lithium outside probes are discussed with regard to stability, efficiency, charge preamplifiers, and power supplies. Problems encountered during in vivo experiments are detailed with regard to grounding and signal filtering. Applications to cardiovascular and renal hemodynamics are contemplated for which the achieved counting rate of 50 counts/sec/microcurie/milliliter seems correct. ESRO

N74-32548*# Pillsbury Mills, Inc., Minneapolis, Minn.
SPACE SHUTTLE FOOD SYSTEM STUDY. VOLUME 1: SYSTEM DESIGN REPORT Final Report
[1974] 104 p refs
(Contract NAS9-13138)
(NASA-CR-134374) Avail: NTIS HC $8.25 CSCL 06H

Data were assembled which define the optimum food system to support the space shuttle program, and which provide sufficient engineering data to support necessary requests for proposals towards final development and installment of the system. The study approach used is outlined, along with technical data and sketches for each functional area. Logistic support analysis, system assurance, and recommendations and conclusions based on the study results are also presented. Author

N74-32549*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
MULTIPARAMETER VISION TESTER Patent Application
Stacey R. Hunt (GE), Robert J. Homkes (GE), Wilmer B. Poteate (GE), and Andrew C. Sturges, inventors (to NASA) (GE) Filed 10 Sep. 1973 72 p
(Contract NASw-1630)
(NASA-Case-MSC-13601-2; US-Patent-Appl-SN-395495) Avail: NTIS HC $6.75 CSCL 06B

A compact optical vision testing unit is reported for testing a relatively large number of physiological characteristics of the eyes and visual system of a human subject. The tester can be used in a number of civilian and industrial applications to provide several complex optical tests having conflicting position and movement requirements in a single compact and integrated unit. The various optical assemblies and devices located within the unit are provided with automatic control mechanisms which may be readily controlled by a programmed computer. NASA

N74-32550*# Life Systems, Inc., Cleveland, Ohio.
SIX-MAN, SELF-CONTAINED CARBON DIOXIDE CONCENTRATOR SYSTEM Final Report
J. D. Powell, F. H. Schubert, R. D. Marshall, and J. W. Shumar Jun. 1974 131 p refs
(Contract NAS2-6478)
(NASA-CR-114743; LSI-ER-134-32) Avail: NTIS HC $9.75 CSCL 06K

A six man, self contained electrochemical carbon dioxide concentrating subsystem was successfully designed and fabricated. It was a preprototype engineering model designed to nominally remove 6.0 kg (13.2 lb) CO2/day with an inlet air CO2 partial pressure of 400 N/sq m (3 mm Hg) and an overcapacity removal capability of 12.0 kg (26.4 lb) CO2/day. The design specifications were later expanded to allow operation at space station prototype CO2 collection subsystem operating conditions. Author

N74-32551# Civil Aeromedical Inst., Oklahoma City, Okla.
PHYSIOLOGICAL, BIOCHEMICAL, AND PSYCOHLOGICAL RESPONSES IN AIR TRAFFIC CONTROL PERSONNEL: COMPARISON OF THE 5-DAY AND 2-2-1 SHIFT ROTATION PATTERNS
C. E. Melton, J. M. McKenzie, R. C. Smith, B. D. Polis, E. A. Higgins, S. M. Hoffmann, G. E. Funkhouser, and J. T. Saldivar Dec. 1973 16 p refs
(AD-778214; FAA-AM-73-22) Avail: NTIS HC $4.00

Stress in controllers on the straight 5-day shift was determined at Houston Intercontinental Tower in 1970. In 1971 controllers on the 2-2-1 rotation were studied at the same tower. Controllers generally prefer the 2-2-1 to the straight 5-day schedule because of the long weekend associated with the 2-2-1. Management is concerned that the quick turnaround on the 2-2-1 is a stressor that could compromise job performance. Physiological and psychological assessments showed no significant stress differences on the two schedules. On neither of the schedules did the controllers' stress levels differ from the general population. Urine and blood analysis showed that day work on the 5-day rotation was generally more stressful than was the 2-2-1. Stress differences on the two rotation patterns were too slight to be of real significance and a choice between them would have to rest on managerial considerations rather than biomedical ones. Author

N74-32552*# National Aeronautics and Space Administration. Pasadena Office, Calif.
RAW LIQUID WASTE TREATMENT SYSTEM AND PROCESS Patent Application
Marshall F. Humphrey, inventor (to NASA) (JPL) Filed 27 Aug. 1974 33 p
(Contract NAS7-100)
(NASA-Case-NPO-13573-1; US-Patent-Appl-SN-501014) Avail: NTIS HC $4.75 CSCL 06I

A raw sewage treatment process is disclosed in which substantially all the non-dissolved matter, suspended in the sewage water is first separated from the water, in which at least organic matter remains dissolved. The non-dissolved material is pyrolyzed to form an activated carbon and ash material without the addition of any conditioning agents. The activated carbon and ash material is added to the water from which the non-dissolved matter was removed. The activated carbon and ash material adsorbs the organic matter dissolved in the water and is thereafter supplied in a counter flow direction and combined with the incoming raw sewage to at least facilitate the separation of the non-dissolved settleable materials from the sewage water. Carbon and ash material together with the non-dissolved matter which was separated from the sewage water are pyrolyzed to form the activated carbon and ash material. Author

N74-32553*# DeBell and Richarson, Inc., Enfield, Conn.
WASH WATER SOLIDS REMOVAL SYSTEM STUDY Final Report, 20 Jun. 1973 - 22 Jul. 1974
Jul. 1974 66 p refs
(Contract NAS9-13536; Proj. 6037.3)
(NASA-CR-140204) Avail: NTIS HC $6.50 CSCL 06I

During wash water purification, surfactants tend to precipitate and foul the RO membranes, causing water flux decline and loss of salt rejection. The use of 165 to 190 ppm ferric chloride and optionally 0.25 to 1.0 ppm polymeric flocculant precipitates 92 to 96 percent of the surfactant from an Olive Leaf Soap based wash water. Crossflow filtration and pressure filtration yield good soap rejection at high water flux rates. Post-treatment of the chemically pretreated and filtered wash water with activated charcoal removes the residual soap down to an undetectable level. Author

N74-32554# Defence and Civil Inst. of Environmental Medicine, Downsview (Ontario). Biosciences Div.
EFFECT OF ARCTIC CLOTHING ON A SHORT-DURATION TASK
C. L. Allen and S. D. Livingstone Oct. 1973 9 p refs
(DCIEM-73-R-974) Avail: NTIS HC $4.00

The performance of individuals participating in a short duration task while wearing Arctic clothing was compared to their performance while wearing light combat clothing. It was found that although there was an increase in the time to complete the task while wearing the Arctic clothing there was no difference in the energy cost. Author

N74-32555# *Imperial Coll. of Science and Technology, London* (England). Dept. of Mechanical Engineering.
THE MEASUREMENT OF BLOOD VELOCITY WITH LASER ANEMOMETRY
N. S. Vlachos and J. H. Whitelaw Mar. 1974 21 p refs
Presented at Workshop on Laser Velocimetry, Lafayette, Ind., Mar. 1974
(HTS/74/13) Avail: NTIS HC $4.25 CSCL 06B

Velocity measurements, obtained with laser anemometry in smallbore glass tubes containing whole blood and saline in varying concentrations up to whole blood, are presented. The corresponding Doppler signals demonstrate the presence of multi-signal scattering in the whole blood and suggest that measurements are unobtainable for tube diameters greater than 250 micron. Related optical and signal-processing problems are discussed. It is concluded that local measurements of blood velocity in venules should be possible provided the venule diameter does not exceed 200 micron. Author

N74-32556# National Aviation Facilities Experimental Center, Atlantic City, N.J.
MAN/MACHINE RELATIONSHIP IN NATIONAL AIRSPACE SYSTEM: PLAN VIEW DISPLAY POSITIONING Interim Report, Jul. - Sep. 1973
Richard Sulzer and Gloria Karsten Mar. 1974 37 p refs
(FAA Proj. 121-105-020)
(AD-776675; FAA-NA-73-90; FAA-RD-74-27) Avail: NTIS HC $3.25

An attempt was made to determine (1) the best angle that the plan view display (PVD) may be inclined while still permitting efficient operation with shrimpboats, (2) the properties of a feasible shrimpboat that will not slide so much as to produce loss of association with the target when used at the proposed angle of elevation, and (3) the properties of a feasible add-on device for fixing the PVD at the angle proposed. Several shrimpboat designs were fabricated and tested at 20 deg, 25 deg, and 30 deg PVD inclinations, both in ideal conditions and in a simulated control situation with air traffic controllers. Shrimpboat model F, arrow-shaped, approximately 1 3/4 inch by 1 inch and 1/16 inch thick, standing on four dabs of silicone, showed best adherence (least slip). The more conventional model A, wedge-shaped, smaller but thicker, was preferred by controllers, but this model was the worst in slip tests. Only at the least steep PVD position was the model A stable. At 25 deg all shrimpboats except A were satisfactory in stability; hence, the 25 deg angle was recommended for the PVD. A simple extension for the leg position bumper was designed and tested to produce the change from a horizontal PVD position, actually 7 deg, to the recommended 20 deg slant. Author

N74-32557*# *Technology, Inc., Houston, Tex.* Life Sciences Div.
FLIGHT FEEDING SYSTEMS DESIGN AND EVALUATION Final Report, 1 Oct. 1968 - 31 Jan. 1973
Clayton S. Huber 31 Jan. 1973 117 p refs
(Contract NAS9-8927)
(NASA-CR-140192) Avail: NTIS HC $9.00 CSCL 06K

The Apollo flight menu design is fully recounted for Apollo missions 7 through 17, to show modifications that were introduced to the Apollo food system, to document the range of menus and nutritional quality, and to describe packaging and preparation procedures for each class of food item. Papers concerning the Apollo 14 food system, and nutrition systems for pressure suits are included, and the following special topics are treated in depth: (1) food handling procedures; (2) modification of the physical properties of freeze dried rice; (3) stabilization of aerospace food waste; and (4) identification and quantitation of hexadecanal and octadecanal in broiler muscle phospholipids. A.A.D.

N74-32558*# Technology, Inc., Houston, Tex. Life Sciences Div.
FLIGHT FEEDING SYSTEMS DESIGN AND EVALUATION. SUPPLEMENT 1: PRODUCTION GUIDES Final Report, 1 Oct. 1968 - 31 Jan. 1973
31 Jan. 1973 299 p
(Contract NAS9-8927)
(NASA-CR-140193) Avail: NTIS HC $18.00 CSCL 06K

The requirements for processing, packaging, testing, and shipment of foods selected for use in the Apollo food system are presented. Specific foodstuffs chosen from the following categories are discussed: (1) soups; (2) juices; (3) breads; (4) meat and poultry products; (5) fruits and nuts; (6) desserts; and (7) beverages. Food procurement for the mobile quarantine facility and for Apollo preflight and postflight activities is also discussed. A.A.D.

N74-32559*# Linguistic Systems, Inc., Cambridge, Mass.
THE ROLE OF PERIPHERAL VISION AND VISUAL VESTIBULAR INTERACTIONS IN THE EXOCENTRIC PERCEPTION OF LINEAR MOVEMENT IN HUMANS
Alain Berthoz, Bernard Pavard, and Lawrence Young Washington NASA Aug. 1974 8 p refs Transl. into ENGLISH from Compt. Rend. Hebdomadaires Acad. Sci. (France), Ser. D, v. 278, 1974 p 1605-1608
(Contract NASw-2482)
(NASA-TT-F-15737) Avail: NTIS HC $4.00 CSCL 05E

The presentation, at the periphery of the visual field, of a scene animated by linear movement, induces a sense of linear displacement of the body in a direction opposite to that of the moving scene. The latencies, thresholds, and saturation limits of this phenomenon are described quantitatively, as well as the dynamic relations between the change of speed of the visual scene and the speed of the subject's displacement. Some modifications of the vestibular evaluation of the linear movement were observed. Author

N74-32560*# *Boeing Aerospace Co., Seattle, Wash.*
DEGRADATION OF LEARNED SKILLS. STATIC PRACTICE EFFECTIVENESS FOR VISUAL APPROACH AND LANDING SKILL RETENTION
Thomas E. Sitterley May 1974 46 p refs
(Contract NAS9-13550)
(NASA-CR-140225; D180-17876-1) Avail: NTIS HC $5.50 CSCL 05I

The effectivess of an improved static retraining method was evaluated for a simulated space vehicle approach and landing under instrument and visual flight conditions. Experienced pilots were trained and then tested after 4 months without flying to compare their performance using the improved method with three methods previously evaluated. Use of the improved static retraining method resulted in no practical or significant skill degradation and was found to be even more effective than methods using a dynamic presentation of visual cues. The results suggested that properly structured open loop methods of flight control task retraining are feasible. Author

N74-32561*# General Electric Co., Philadelphia, Pa. Space Div.
SOLID METABOLIC WASTE TRANSPORT AND STOWAGE INVESTIGATION Technical Report, 1 Jun. 1973 - 31 May 1974
R. A. Burt, M. G. Koesterer, and S. R. Hunt, Jr. 21 Aug. 1974 361 p refs
(Contract NAS9-13518)
(NASA-CR-140227; Doc-74SD4221) Avail: NTIS HC $21.25 CSCL 06I

The basic Waste Collection System (WCS) design under consideration utilized air flow to separate the stool from the WCS user and to transport the fecal material to a slinger device for subsequent deposition on a storage bowel. The major parameters governing stool separation and transport were found to be the area of the air inlet orifices, the configuration of the air inlet orifice and the transport air flow. Separation force and transport velocity of the stool were studied. The developed inlet orifice configuration was found to be an effective design for providing fecal separation and transport. Simulated urine tests and female user tests in zero gravity established air flow rates between 0.08 and 0.25 cu sm/min (3 and 9 scfm) as satisfactory for entrapment, containment and transport of urine using an urinal. The investigation of air drying of fecal material as a substitute for vacuum drying in a WCS breadboard system showed that using baseline conditions anticipated for the shuttle cabin ambient atmosphere, flow rates of 0.14 cu sm/min (5 cfm) were adequate for drying and maintaining biological stability of the fecal material. Author

N74-32562*# Scientific Translation Service, Santa Barbara, Calif.
ON THE PROBLEM OF SELF-PURIFICATION OF AIR IN SEALED COMPARTMENTS WITH LIMITED VENTILATION
E. M. Rogozina and A. M. Kozik Washington NASA 23 Sep. 1974 8 p refs Transl. into ENGLISH from Gig. Sanit. (USSR), no. 5, May 1974 p 43-45
(Contract NASw-2483)
(NASA-TT-F-15923) Avail: NTIS HC $4.00 CSCL 06K

The action of human metabolites, such as carbon monoxide, carbon dioxide, ammonia, phenol, and hydrogen sulfide, in the atmosphere of a hermetically sealed room was studied. The surfaces of the room are cooler than the air, and thus condensation forms at the rate of 160 to 250 g/hour/sq m. At various intervals during the 72 hour experiment, condensation from the room surfaces was analyzed; the results are shown in three charts. It appears that the substances which are water soluble, i.e., acetone, phenol, ammonia, and hydrogen sulfide, are removed from the air in the condensate, while carbon monoxide and carbon dioxide remain in the atmosphere. The amount of water in the air released by human subjects at rest or during light work is sufficient to dissolve significant quantities of water soluble metabolites and thus, to a certain extent, purifies the air.
Author

N74-32563*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
DEVELOPMENT AND APPLICATION OF RIDE-QUALITY CRITERIA
David G. Stephens Sep. 1974 12 p refs
(NASA-TM-X-72008) Avail: NTIS HC $3.00 CSCL 05E

Ride quality vibration criteria applicable to the design and evaluation of air and surface transportation systems are described. Consideration is given to the magnitude of vehicle vibration experienced by the passenger, the frequency of vibration, the direction of vibration measurements are presented for a variety of air and surface transportation systems. In addition, simulator data on seat dynamics and passenger response are presented. Results suggest the relative merits of various physical descriptors and measurement locations for characterizing the vibration in terms suitable for the design and/or evaluation of transportation systems. Author

N74-32564*# Hamilton Standard Div., United Aircraft Corp., Windsor Locks, Conn.
PRELIMINARY FLIGHT PROTOTYPE WASTE COLLECTION SUBSYSTEM Final Report
Joseph E. Swider, Jr. Apr. 1974 227 p
(Contract NAS9-12938)
(NASA-CR-140240; SVHSER-6509) Avail: NTIS HC $14.50 CSCL 06I

The zero gravity test program demonstrated the feasibility and practicability of collecting urine from both male and female crew members in a zero gravity environment in an earthlike manner not requiring any manual handling of urine containers. In addition, the testing demonstrated that a seat which is comfortable in both regimes of operation could be designed for use on the ground and in zero-gravity. Further, the tests showed that the vortex liquid/air separator is an effective liquid/air separation method in zero gravity. Visual observations indicate essentially zero liquid carry over. The system also demonstrated its ability to handle post elimination wipes without difficulty. The designs utilized in the WCS were verified as acceptable for usage in the space shuttle or other space vehicles. Author

N74-32565# Atomic Energy Commission, Washington, D.C. Div. of Waste Management and Transportation.
HIGH LEVEL RADIOACTIVE WASTE MANAGEMENT ALTERNATIVES
May 1974 94 p refs
(WASH-1297) Avail: NTIS HC $5.45

A summary of a comprehensive overview study of potential alternatives for long term management of high level radioactive waste is presented. The concepts studied included disposal in geologic formations, disposal in seabeds, disposal in ice caps, disposal into space, and elimination by transmutation. NSA

N74-32566# Los Alamos Scientific Lab., N.Mex.
SELECTION OF RESPIRATOR TEST PANELS REPRESENTATIVE OF US ADULTS FACIAL SIZES
A. Hack, E. C. Hyatt, B. J. Held, T. O. Moore, and C. P. Richards Dec. 1973 32 p refs Sponsored in part by Natl. Inst. for Occupational Safety and Health, Cincinnati
(Contract W-7405-ENG-36; AEC Proj. M-020; Proj. R-061; Proj. R-072)
(LA-5488) Avail: NTIS HC $4.00

Anthropometric specifications are reported for subjects to test the fit of half mask, quarter mask, and full facepiece respirators. Subjects were selected on the basis of face length and face width to wear full face masks in tests. For testing half and quarter masks, face length and lip length were used. Test panels containing 25 male and female subjects were used to represent a majority of the working population. A sequential sampling scheme was developed to reduce the amount of testing required to determine if a mask provides adequate protection for different facial sizes. Examples of man test results are given.
Author (NSA)

N74-32567# Posterijen, Telegrafie en Telefonie, The Hague (Netherlands). Dr. Neher Lab.
ERGONOMIC ASPECTS OF THE DESIGN OF A CONSOLE [ERGONOMISCHE ASPECTEN BIJ HET ONTWERP VAN EEN MEETTAFEL]
J. A. VanOoster Jan. 1972 35 p refs In DUTCH
(SL-282) Avail: NTIS HC $4.75

Ergonomic factors influencing the operation of man console systems are discussed. The design of a console for telecontrol of telephone and data communications is dealt with, including position and choice of operating devices and visual aids. ESRO

N74-32568# McDonnell-Douglas Astronautics Co., Richland, Wash. Donald W. Douglas Labs.
IMPLANTED ENERGY CONVERSION SYSTEM Annual Report, 8 Jul. 1972 - 8 Jul. 1973
R. P. Johnston Jul. 1973 104 p refs
(Contract PH-43-67-1408-D)
(PB-231008/4; MDC-G4418) Avail: NTIS HC $4.50 CSCL 06L

Progress toward developing an implantable power source for an artificial heart based on the Stirling cycle principle is described. During recent acute animal implant tests spanning up to 28 hours, a completely implanted radioisotope-fueled power source achieved full ventricle relief without external power or control while assuming the full pumping load of the arterial side of the cardiovascular system. Bench tests show that the power source provides ventricle relief at blood flow to 10 liters/minute. The engine operated continuously at designed power for over seven months (greater than 5000 hours) during an electrically heated laboratory life test. GRA

N74-32569# Human Resources Research Organization, Alexandria, Va.
SIMULATION AND AIRCREW TRAINING AND PERFORMANCE
Wallace W. Prophet and Paul W. Caro Apr. 1974 14 p refs
Presented at OCRD Conf., Fort Rucker, Ala., Nov. 1973
(AD-780688; HumRRO-PP-4-74) Avail: NTIS CSCL 05/9

The paper outlines some major areas of use of simulation in Army Aviation and comments on current research. Equipment development, crew performance studies, concept development and training are discussed. Only in the training area has the Army made substantial progress. A broad program of simulation research with emphasis on engineering and behavior is suggested toward the goal of improving aircrew performance. There are significant simulation research problems unique to the Army which need to be worked out. Author (GRA)

N74-32570# Operations Research, Inc., Silver Spring, Md.
ASSESSMENT OF MODIFICATIONS TO THE EXPERIMENTAL DISTRESS ALERTING AND LOCATING SYSTEM Final Report
E. Feinberg, P. Steen, D. McGregor, M. Cornell, and J. Brown Dec. 1973 107 p
(Contract DOT-CG-31446-A)
(AD-780599; USCG-D-73-74) Avail: NTIS CSCL 06/7

The report documents a study of modifications required to allow for the use of the experimental Distress Alerting and Locating System (DALS) as a preoperational SAR system. In particular, the following areas are addressed: Multiple access and false alarms in an attempt to prevent system saturation; Automatic deployment techniques for the user device (hand-held unit); Situation coding to describe emergency status of distressed vessel/person; The feasibility of a frequency modification for operation on an allocated safety and distress frequency; Repackaging techniques incorporating a non-destruct antenna, long shelf life batteries and a sealed (environmentally protected) case; and The desirability and feasibility of adding to the distress device an on-air indicator and/or a response to your call indication. Author (GRA)

Subject Index

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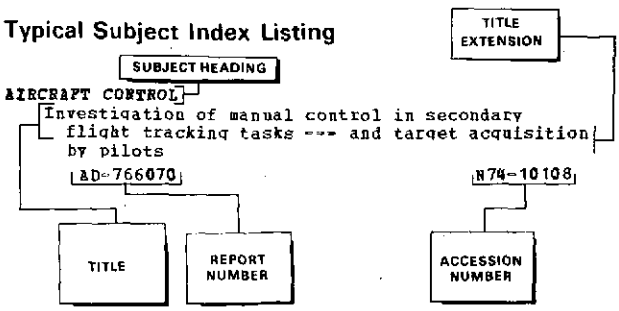

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AEROSPACE MEDICINE AND BIOLOGY / *A Continuing Bibliography (Suppl. 135)* **DECEMBER 1974**

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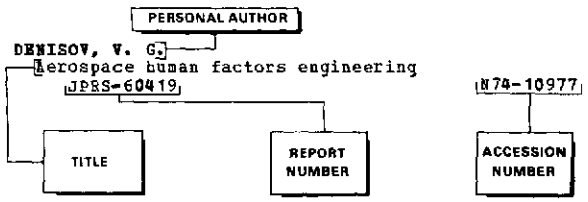

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